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This Month's Cover

A tractor-drawn potato planter working on land at Tutaenui in Rangitikei County is the subject of this month's cover, which has been reproduced from a colour photograph by National Publicity Studios. It is estimated that between 21,000 and 22,000 acres of potatoes are required each year to meet commercial requirements. This acreage will normally produce sufficient potatoes for local needs, but total production is influenced by seasonal yield, which fluctuates considerably.

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29 SEP 1955

Ruakura Farmers' Conference

By G. J. NEALE

CROWDS estimated at up to 6000 farmers who visited the Department of Agriculture's Ruakura Animal Research Station for the field day there during the Ruakura Farmers' Conference in June were spread throughout the 14 demonstration points by 20 buses that made the circuit of the Station continuously throughout the day. So effective has this system of distribution adopted 3 years ago become that the Station staff are enthusiastic about the greater opportunities it offers them to demonstrate the work at Ruakura, and public approval of the value received at the field day is evident in the rapidly mounting attendances.

A MODIFICATION of the same system was used at the Hill Country Station, 15 miles from Ruakura in the Raglan hills. Here a fleet of trucks and other Station vehicles took visitors in a shuttle convoy service from the principal demonstration points in the administration buildings at road level to other demonstrations in the high country at the back of the Station.

The objective of Ruakura has been defined by the Superintendent, Dr. C. P. McMeekan, as "an attempt to place animal production on a factual basis". The excellent organisation of the conference as a whole and of the field day in particular enabled farmers to see the extent to which this aim is being achieved in the research projects under way at Ruakura and the Hill Country Station.

If the system of buses continuously circulating points of interest can justify the application of the term circus to this annual display at Ruakura, the analogy could be extended and the farmers' conference described as undoubtedly the greatest agricultural research show in the country, with Dr. McMeekan and his performing animals drawing crowds that are posing serious accommodation problems.

Need for Ruakura Hall

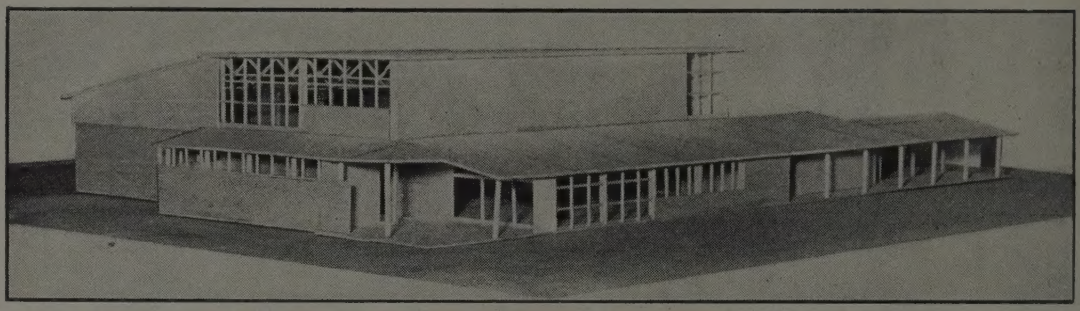
Last year the inadequacy of the Ruakura Staff Centre for the crowds attending the sessions for sheep farmers on the first day of the conference was so apparent that a committee of farmer and industry representatives was immediately set up to investigate ways of providing adequate and suitable accommodation. Cabinet approval was received for Government pound for pound subsidy to the extent of £15,000 provided farmers contributed the balance required to build a hall at Ruakura at an estimated cost of £30,000.

Support the committee has received during the past year in its efforts to raise £15,000 has been disappointing and when this year's conference started the amount collected was still more than £5000 short of the objective. The hall is intended for general farmer and industry use, and a committee member appealing for further support at this year's conference stated that there were 43 occasions last year on which such a hall could have been used by industry organisations. Several of the committee spoke to the conference in support of the appeal and Dr. McMeekan, speaking in the large Hamilton picture theatre that has been used for several years for the sessions

↑ A transport convoy preparing to leave the Whatawhata Hill Country Station headquarters for inspection of research projects and hill country development in the high country at the back of the Station.

1—Comparative illustrations of growth-rate and carcass conformation of dairy and dairy x beef cattle at the project showing how the 50,000 tons of extra beef production required can be achieved by crossing a proportion of the cows in a dairy herd with a beef bull. 2—At the demonstration of the effect of controlled v. uncontrolled grazing on the lifetime performance of the dairy cow. 3—Display of the chemical principles in the attempt to separate from grass the toxin causing facial eczema. 4—Dr. L. R. Wallace demonstrating work on hormone injection of ewes to increase lambing percentages. 5—I. J. Inkster discussing cattle management on hill country. 6—Dr. C. P. McMeekan: "Ruakura has not thrown in the towel on facial eczema research." 7—On the fat lamb area at Ruakura where long-term comparisons are being made of the meat production under grazing systems of all cows; all steers; lambs and steers.

Ruakura Points the Way to Increased Production



A model of the proposed new conference hall at Ruakura for which the Government has offered a subsidy of £15,000 if farmers provide the other £15,000 required.

for dairy farmers and for presentation of general farming papers, stressed the desirability of such conferences being held in a farming atmosphere and with adequate facilities rather than in a Hamilton theatre. A scheme to appeal to farmers to donate the proceeds of one or more bobby calves from lots forwarded to the works has been launched and the committee, assisted by young farmers, collected donations at conference sessions.

Dependence on Research

The necessity to depend more and more on the results of scientific research to give increased efficiency in farming was referred to by Mr. F. C. Johnstone, deputy chairman of the New Zealand Meat Producers Board, in opening the conference. "We producers are, and should be, keenly interested in the progress of research of the kind that is being done at Ruakura," he said.

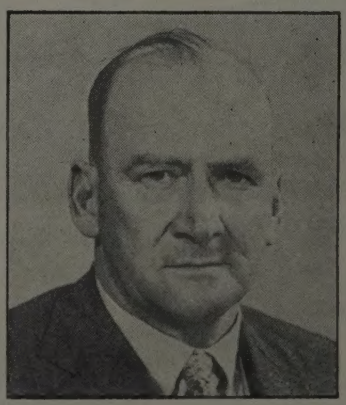
"Production from our farms has always been the major part of the country's total output measured in value. In 1952-53 farm output was worth 61 per cent. of New Zealand's total production. This percentage comparison of value gives perhaps an underestimate, since the products of our secondary industries are valued at local prices, often much above world parity, whereas those of the primary industries are sold at world prices; and of course farm production supplies practically the whole of this country's overseas exchange. Farm products currently account for 95 per cent. of our overseas income. Pastoral products alone provide 90 per cent. of the total value of New Zealand exports."

Of a total population now exceeding 2 millions, said Mr. Johnstone, only 400,000 worked or lived on the land. The number of farm workers had fallen from 136,000 in 1930 to 126,000 in 1950. In view of the vital place of farming in New Zealand's economy, the loss of manpower from farming to secondary industry had created a shortage of labour on farms that was economically unsound.

"New Zealand and Australia are unique," he continued, "in that they are the only two countries in the world where farming shows a higher productivity per head than secondary industry. This means in New Zealand that every time workers are transferred from farming to secondary industry the sum total of New Zealand's production is lowered, and since that production represents the total available for distribution, our real national income is thereby lowered.

Mr. Johnstone questioned whether in spending less than ½ per cent. of the value of farm production on research New Zealand was doing enough, and whether the best brains were being encouraged to become interested in farm research. In listing the things farmers expected from research he said that many farmers seemed to want to hide the fact when their sheep were affected with facial eczema and he thought the seriousness of all losses was therefore not disclosed, thus masking the urgency of the need for more work on this disease.

Unthriftiness in hoggets was another project he would like to have more research attention. "In our area," he said, "I would place this second only to eczema in priority for research, and it may account for greater economic loss."



Mr. F. C. Johnstone: Is the expenditure of less than ½ per cent. of the value of farm production on research enough?

The results of the research into determination of the age to aim for in the fattening of beef cattle were of major importance.

The pumice lands, regarded only 20 years ago as useless, had been turned into some of the highest producing land in New Zealand with the use of cobalt and special techniques of management. Other problem soils had been made productive through research by the application of copper to peat and of molybdenum to poor clay hill country.

Though some research might appear to the practical farmer to be unproductive, Mr. Johnstone concluded, it often produced very valuable information, even if it were only that results must be looked for elsewhere. With the continued availability to farmers of the type of research information produced at Ruakura, the industry should be capable of still more spectacular results.

The Field Day

Demonstration points at Ruakura, at which research workers associated with the projects discussed them with farmers throughout the field day, were as follows:—

1. **The Wool Shed:** Animal rumen studies; pasture wastage through the over-fattening of ewes.

Cattle Yards: Design and equipment of beef cattle yards; selection of the herd sire on performance; indication of the part cross-breeding from dairy cows with beef bulls can play in the production of the 50,000 tons more beef required.

2. **Ewe Nutrition:** The necessity for planned grazing to ensure the feeding of the fat lamb flock well from a variable amount of pasture throughout the year, the important times being early winter, before and after lambing, the spring flush, after weaning, and before and during tupping.

3. **Fat Lamb Area:** Beef and lamb production per acre (all cows, versus

all steers, versus lambs and steers). The output per animal and per acre at different stocking rates was shown.

4. **Fertility in Ewes:** Five ways in which lambing percentage can be increased by 20 per cent. Work at Ruakura on the injection of ewes with hormones to induce multiple lambing.

5. **No. 1 Dairy:** Dairy shed design and demonstration of the principles of efficient milking. Here and at No. 2 Dairy first commercially produced models of the Ruakura milking machine were displayed.

6. **Ruakura Piggery:** How to achieve maximum production on the pig farm.

7. **Fertility Centre:** Causes and control of infertility in the dairy herd; T.B. in cows.

8. **New Zealand Dairy Board's Artificial Breeding Centre, Newstead:** Next season's team of proven sires.

9. **No. 2 Dairy:** The effect of controlled and uncontrolled grazing on the lifetime performance of the dairy cow.

10. **Slaughterhouse:** The meaning of carcass quality in fat lambs and ewes.

11. **Dairy Cattle Nutrition Centre:** Size of cow and production per acre; Ruakura's recommendations on the rearing of calves; evaluation of feeds for dairy stock.

12. **No. 5 Dairy Farm:** New machines and methods for oversowing existing pastures and establishing new ones.

13. **No. 4 Dairy:** Research results from the use of identical twin cattle.

14. **Ruakura Staff Centre:** Diagnostic section; facial eczema research; poisoning in farm stock; worms in sheep and cattle; hormone weedkillers.

Hill Country Station: Development of reverted country; sheep fertility; out-of-season lambs; significance and control of worms in sheep; skirting fleeces; face cover in sheep; cattle management.

Papers and Discussion

A list of speakers and subjects appears on page 118. Printed "Proceedings" of the conference, containing papers and discussion, will be sent to all those who paid conference fees.

. . . RUAKURA CONFERENCE

Others requiring copies (10s. each) should place orders early with the Ruakura Station or the Publications Section, Department of Agriculture, Box 2298, Wellington, as soon as possible.

Facial Eczema

A high light of the conference was the paper by Dr. McMeekan, "Common Misconceptions about Facial Eczema Control in Sheep and Cattle", which appeared to be keenly awaited and which drew more than a full house to the conference theatre. Many inquiries had been made of Ruakura workers during the recent outbreaks of facial eczema by farmers who had once again suffered severe economic losses, said Dr. McMeekan, and there had been much criticism that Ruakura knew nothing about facial eczema, that its advice on control was unsound, and that the towel had been thrown in on research into it.

"Though I can well understand that many farmers who neither read nor

Upper left—Inspection of sheep breeding and cattle management on the Hill Country Station. Upper right—Some of the hill country being brought in and grassed at the rate of 100 acres a year. Lower left—Headquarters of the Hill Country Station. Lower right—E. A. Clarke (left), who is in charge of the Station. K. D. Watt demonstrating the skirting of a fleece.

listen, or who have misunderstood what they have read or heard, may unthinkingly hold and sometimes express views such as these, it is quite incomprehensible to me why men of repute and of standing in their farming community should be so misguided as to take apparent pleasure in publicising their belief in the three misconceptions referred to," said Dr. McMeekan. "Over the last several years and during these last few weeks in particular I have many times wished that they had shared with me the tragic experience of desperately trying to salvage something from the flocks wrecked as a result of the confidence they had inspired in other farmers who cannot afford the luxury of being proven wrong."

Dr. McMeekan quoted cases of severe losses through disregard of the recommendations to shut flocks up as a precaution when facial eczema warnings were issued. He then reviewed what had happened on the sheep farms under his control at Ruakura in the past 12 years. "During 5 of these years it was not considered necessary to take any precautions. In each of the remaining 7 years our own recommendations were applied each year. On each occasion some test sheep were allowed to run freely to determine whether the disease was or was not present on the farm so that the efficiency of our control measures could be tested. During 3 of the 7 potentially dangerous seasons no facial eczema occurred either in these test sheep or in the flocks. Thus, on approximately half the occasions the precautions were needless. On the other hand, during the remaining 4 seasons at least some test sheep contracted facial eczema, but it was prevented in the main flocks with which the recommended precautionary measures were taken. Over these periods 2000 to 3000 sheep were run on Ruakura each year. These were not in one, but in 5 to 8 separate flocks each year on separate, self-contained farms."

The current season, which was typical of experience at Ruakura, was described by Dr. McMeekan, who said it was a reasonable conclusion that Ruakura pastures were extremely dangerous after 1½in. of rain in February, 1.3in. in March, and ½in. in April.

There were 5 separate flocks totalling 1520 ewes on Ruakura and an additional 240 hoggets were confined to a crop of chou moellier during the first two periods. By April when the crop was finished these hoggets, except for 88 used as test animals, were shut up like the ewes in the third period. Four of the ewe flocks were confined at 200 to the acre and the other at 65 to the acre. By the middle of April after the first two danger periods there were no cases of facial eczema in the 4 flocks confined at 200 to the acre and 6 cases in those confined at 65 to the acre. After the April rains there were 2 cases in one of the flocks run at 200 to the acre and in the flock at 65 to the acre the original 6 cases had increased to 9. The 88 test hoggets showed on slaughter in May 60 per cent. severely affected livers and 25 per cent. with severe jaundice; and 36 test 2-tooth wethers running free showed 30 per cent. with damaged livers.

The precautionary measures properly applied had been extremely successful. Losses by farmers who claimed to have followed them were attributed to the animals not being confined soon enough, tightly enough, or long enough.

"I am quite certain that our recommendations are completely practical," Dr. McMeekan stated. "If they are properly applied they will give complete control. Even if it is not done with complete efficiency, shutting up will reduce the incidence of the disease. Finally, once a flock is affected there is no point in shutting up unless a new danger period occurs."

In a spirited criticism of those who expressed the opinion that "Ruakura has thrown in the towel on facial eczema research" Dr. McMeekan said there may have appeared to be a lull over the last few years, but that was because of the firm conviction that the next major and most profitable stage of the journey forward was the identification of facial eczema toxin. Over the past 4 years 4 tons of dried grass from the special facial eczema research area at Manutuke in Poverty Bay and from a large number of Waikato properties with bad reputations for the disease had been collected, dried, and tested for toxicity by being fed to guinea pigs. The hunt had been extremely disappointing and difficult and it was not until this season that about 300lb. of material of high toxicity had been obtained. This year for the first time in 17 years the biochemist had his first real chance of making progress, though the position was intensely complicated because of the several hundred different substances besides the possible toxin that were contained in ether extracts of grass. Separation of the unwanted substances from the toxin had to be made and final solu-

Papers and Speakers

Opening address—Mr. F. C. Johnstone, deputy chairman, New Zealand Meat Producers Board.

"The Principles of Efficient Beef Production"—Dr. M. A. Macdonald, Research Officer, Ruakura.

"The Performance of Beef Cattle on Fat Lamb and Hill Country"—Miss D. E. K. Walker, Meat Research Officer, Ruakura.

"The Use of Hormones to Control the Time of Lambing and the Lambing Percentage"—Dr. L. R. Wallace, Chief Animal Nutrition Officer, Ruakura.

"Face Cover and Productivity in Sheep"—I. J. Inkster, Research Officer, Ruakura.

"Marketing the North Island Wool Clip"—K. D. Watt, Head of Wool Department, Massey Agricultural College.

"Some Economic Aspects of Developing Hill Country"—R. H. Scott, Land Utilisation Officer, Department of Agriculture.

"How Cold Should New Zealand Beef be, Chilled or Frozen?"—Mr. F. G. Knight, acting general manager, W. & R. Fletcher (N.Z.) Limited, Mr. N. Thomson, general manager, Auckland Farmers' Freezing Co. Limited, and Dr. M. A. Macdonald.

"Common Misconceptions about Facial Eczema Control in Sheep and Cattle"—Dr. C. P. McMeekan, Superintendent, Ruakura.

"The Use of Antibiotics on the Sheep Farm"—D. W. Caldwell, Veterinarian, Department of Agriculture, Hamilton.

"The Use of Antibiotics on the Pig Farm"—D. M. Smith, Pig Research Officer, Ruakura.

"The Ruakura Diagnostic Section"—D. C. Dodd, Diagnostic Officer, Ruakura.

"New Machines and Methods for Oversowing Pastures"—M. W. Cross, Lecturer in Farm Machinery, Massey Agricultural College.

"Planned Farm Drainage"—D. G. Bowler, Drainage Advisory Officer, Massey Agricultural College.

"Copper in Peat Development"—I. L. Elliott, Assistant Superintendent, Rukuhia Soil Research Station.

"The Problem of Farm Costs"—Mr. A. H. Hayward, chairman of directors, New Zealand Co-operative Dairy Co. Ltd.

"The Changing Pattern of Herd Improvement in New Zealand"—Mr. A. H. Ward, general manager, New Zealand Dairy Board.

"Breeding for Production"—Dr. C. P. McMeekan.

"Meeting the Seasonal Feed Requirements of the Dairy Herd"—Dr. L. R. Wallace.

"Efficient Milking"—Dr. W. G. Whittlestone, Physical Chemist, Ruakura.

"Increased Production through Disease Control"—J. C. Gerring, Animal Research Extension Officer, Ruakura.

"Controlling Mastitis"—N. R. McDonald, Veterinary Research Officer, Wallaceville.

"Controlling Infertility"—Dr. J. P. James, Director of Artificial Breeding, New Zealand Dairy Board.

"Leptospirosis in Dairy Cattle"—D. C. Dodd.

tion of the problem might still be many years off.

In the meantime, concluded Dr. McMeekan, Ruakura was still accumulating as much data as possible on the environmental conditions associated with facial eczema outbreaks, on management techniques and control, and on ways and means of handling outbreaks so that losses could be reduced to a minimum; and in the obtaining of the kind of information necessary much more direct farmer co-operation was needed.

Dr. McMeekan's frontal attack on critics of Ruakura and farmers who had themselves not carried out the Department's recommendations or had persuaded others to ignore them was warmly received by his large audience. An excellent display of the complexities of the biochemist's task in attempting to isolate the toxin attracted great attention during the field day at Ruakura and probably conditioned many farmers to the inevitability of the long road ahead of the research worker as presented by Dr. McMeekan. A vote of confidence in the Department's animal research staff was carried enthusiastically after Dr. McMeekan and scientists associated with the work on facial eczema had answered a number of farmers' questions.

Marketing of Beef

A panel of speakers who discussed the question "How Cold Should New Zealand Beef Be, Chilled or Frozen?" provided a lively session thoroughly enjoyed by a large audience. Mr. F. G. Knight, acting general manager of W. and R. Fletcher (N.Z.) Ltd., and Mr. N. Thomson, general manager of Auckland Farmers' Freezing Co. Ltd., presented forceful cases for chilled and frozen meat respectively and Dr. M. A. Macdonald, a Canadian scientist whose work at Ruakura on the principles of efficient beef production has attracted a great deal of industry attention and appreciation, argued the advantages of pre-cutting, pre-packaging, and quick freezing. With the chairman, Dr. McMeekan, exercising a very liberal interpretation of the "no holds barred" theory, the meat industry got the sort of thorough airing dear to the hearts of a New Zealand farmer audience. Stalemate was reached when the women in the audience were asked to vote on their preference for pre-packaged meat and the chairman declined to give the casting vote.

Problem of Farm Costs

A feature of Ruakura conferences has been the opportunity afforded industry leaders to have frank discussions with farmers at night sessions.

. . . RUAKURA CONFERENCE

The problems associated with the change from bulk selling of produce to the United Kingdom back to free marketing, and of producing at a cost and in forms that would sell on a heavily supplied market, were dealt with by Mr. A. Hayward, chairman of directors of the New Zealand Co-op. Dairy Co. Ltd. and a member of the New Zealand Dairy Board. The prosperity of all in New Zealand depended, he said, on ability to continue to produce the country's only export commodity, agriculture, at prices within the means of its customers. He gave his reasons for the continual upward trend in New Zealand's cost structure, which sprang in the main from over-employment, which in turn was mainly due to over-emphasis on capital works.

Mr. Hayward's exhaustive paper was followed by considerable discussion of what cost factors, if any, were within the producer's control and what he could do to reduce them. There appeared to be general agreement that any amelioration must come through the research and extension worker in showing how production per acre and per cow could be expanded and higher efficiency standards attained through artificial breeding and herd recording.

Photographs, except the lower one on page 116, by Fraser Niederer.

Sale of Pedigree Large White Boars at Ruakura

The first public auction in New Zealand of tested and selected pedigree pigs, from the pig centre of the Department of Agriculture's Ruakura Animal Research Station, was held at Ruakura during the field day of the farmers' conference on 15 June. The 18 young Large White boars were sold on behalf of the New Zealand Pig Producers Council, which provided the extra facilities needed at Ruakura for the Station to carry out the work on the development for the pig industry of a national hybrid pig. The boars were all from litters that had been tested for growth-rate, efficiency of feed conversion, and carcass quality.

The boars realised a total of 830 guineas, the average price being 46 guineas and the top price 80 guineas for a 9-months-old boar bought by a Manawatu breeder. Buyers were from many parts of the North Island and as far south as Dunedin.

Above are scenes during the sale with, inset at top left, D. M. Smith (left), Pig Research Officer at Ruakura, discussing the sale with Mr. D. J. Carter, chairman of the New Zealand Pig Producers Council.

Crops for Pig Feeding

WHEN skimmed milk supplies are inadequate crops fed with suitable amounts of meal are valuable for pig feed. In autumn such supplementary feed will finish off pigs for sale, and in winter it will keep breeding sows and late autumn litters in condition and will also bring stores through in thriving condition until spring skimmed milk supplies are available. In this article E. H. Arnold, Assistant Fields Superintendent, Department of Agriculture, Auckland, discusses the requirements for growing a crop for pigs and the types of crops usually grown.

ONLY small areas are required for the production of crops for pigs, from ½ to 1 acre being sufficient on most farms. Soils with stored-up fertility such as pig runs requiring re-grassing are ideal. A portion of a field in which the pasture requires renewal and which is in handy carting distance of the piggery layout is next best. A new area each year avoids trouble from weeds and early initial cultivation is essential. Land lying fallow or previously cropped should be deep ploughed, and land in grass should be worked before ploughing so that the turf is well disintegrated and can be incorporated into the seed-bed. On heavy soils ploughed early sufficient firmness may be obtained without rolling, but on light soils repeated use of the roller will prove necessary.

Crops with small seeds, for example, carrots and fodder beet, require a very fine and firm seed-bed. Maize and pumpkins grow well when the seed-bed is fine and firm below but slightly lumpy on the surface. A small area which has been thoroughly cultivated will yield as much pig food as a larger area which has been only half worked.

Crops sown in rows are more easily intercultivated and kept free from weeds. All crops require phosphates, and those on land previously cropped may need nitrogen.

The crop must suit the district, the soil, and the pig, which has a small stomach. Sugar beet and fodder beet are unsurpassed for production on the farm of a cheap basic food for pigs, and can be left in the ground until required. Both leaves and roots can be fed directly after pulling and are relished by pigs. Apart from their suitability for winter feed these roots can make up half of a fattening ration and as such are extremely valuable for finishing off pigs in autumn.

Mangolds, a much more bulky feed, require storing for 6 weeks before feeding and have now no place as a pig crop. Carrots, which are less nutritious than fodder beet, are readily eaten and can be left in the ground until required. Swedes, a very bulky feed, are less relished, but have proved useful for maintaining winter stores. Artichokes, though low yielding and low in nutrients, are easily harvested by turning in the pigs to root out the tubers. Maize, suitable for growing in the warmer parts of Auckland Province, is a more concentrated food and can be fed on the cob and stored over until the next year. Pumpkins, much relished, have a fairly high food value, as the pigs eat the seeds as well as the flesh. Kumikumis are less nutritious than pumpkins.

Peas are a more protein-rich concentrate. They do not require threshing, which can be done by the pigs themselves. Apart from peas all these crops are deficient in proteins and certain minerals. These can be supplied to some extent by grazing the pigs on short, leafy pasture or by feeding ½lb. of meat meal or 1lb. to 1½lb. of peas or pea meal per pig per day.

HEADING PHOTOGRAPH: Typical sugar beet plants. The roots are similar in appearance to those of parsnips, but are thicker. The tops often weigh up to 90 per cent. of the total crop weight.

Meteorological Records for June

Station	Height of station above M.S.L. (ft.)	Air temperatures in degrees (Fahrenheit)				Rainfall in inches					Bright sunshine hours
		Approx. mean	Difference from normal	Absolute maximum and minimum		Total fall	No. of days of rain	Difference from normal	Maximum fall		
				Maximum	Minimum				Amount	Date	
Kerikeri	201	53.0	+ 0.9	66.8	38.1	10.38	23	+ 3.30	2.07	6	96.2
Auckland	160	52.6	— 0.4	65.2	39.0	6.00	22	+ 0.61	0.81	27	114.0
Tauranga	10	49.2	— 0.7	65.3	27.4	5.27	13	— 0.28	2.24	30	144.6
Ruakura	131	47.1	— 0.4	66.2	24.9	5.01	18	+ 0.23	1.00	1	115.8
Rotorua	975	45.4	— 1.0	63.0	25.7	4.35	15	— 0.97	1.44	22	133.0
Gisborne	12	48.7	— 0.1	72.6	28.7	3.49	17	— 0.72	0.80	7	124.1
New Plymouth	160	49.0	— 1.1	61.2	33.1	7.85	16	+ 1.67	2.30	1	119.9
Karioi	2125	40.4	— 1.1	64.0	23.9	6.06	17	+ 0.96	1.61	1	
Napier	5	49.0	+ 0.3	66.0	29.0	2.65	9	— 0.41	0.90	30	132.0
Wanganui	72	48.2	— 0.6	63.3	32.4	5.41	15	+ 2.02	2.06	1	94.5
Palmerston North	110	46.1	— 0.9	63.1	26.7	4.13	15	— 0.22	1.19	1	89.6
Waingawa	340	44.7	— 0.7	64.3	24.0	5.12	24	+ 1.03	1.30	1	73.8
Wellington	415	46.3	— 1.4	60.0	34.0	7.89	25	+ 3.24	2.00	1	89.5
Nelson airfield	5	43.6	— 0.5	57.8	24.7	3.70	11	+ 0.41	1.90	1	156.7
Blenheim	12	44.6	— 0.3	60.7	25.1	2.52	11	+ 0.04	0.95	1	154.4
Hokitika	15	44.9	+ 0.6	60.1	26.8	7.29	14	— 1.54	2.23	13	123.4
Hanmer	1270	39.0	— 0.7	60.3	20.5	5.67	15	+ 2.18	1.61	1	60.0
Christchurch	22	43.6	+ 0.4	63.7	25.4	4.76	18	+ 2.17	1.19	2	91.1
Ashburton	323	42.0	+ 0.2	63.8	23.4	3.29	12	+ 0.69	0.84	13	97.4
Timaru	56	42.5	+ 0.1	67.2	27.2	1.44	14	— 0.43	0.47	13	105.8
Alexandra	520	38.5	+ 0.8	58.7	20.7	1.82	12	+ 1.03	0.69	2	61.8
Taieri	80	42.0	+ 0.2	64.5	26.3	5.11	19	+ 2.79	1.58	2	72.6
Invercargill airfield	0	41.6	+ 0.0	58.9	25.1	7.00	22	+ 3.35	1.70	2	56.3

The Home Orchard in Spring

SPRINGTIME in the garden is the season of greatest activity. Gardeners may tend to neglect their fruit trees in favour of the more obvious need to dig, sow, and plant their vegetables and flowers. However, routine work in the home orchard must be done efficiently at the correct time in spring if the crop is to be free from disease and of good size and quality. In this article S. P. Money, Horticultural Instructor, Department of Agriculture, Wellington; deals with routine work, spray schedules, certified spray materials, and two common diseases of stone fruit and discusses the fertiliser requirements of fruit trees.

ROUTINE work involves attention to orchard hygiene, spraying, manuring, and thinning. Neglect of any one of these may bring about disappointing results despite extra work put into others.

Orchard Hygiene

One of the sources of disease in the home orchard is litter from the previous season's work and crop. All prunings should be picked up and burnt, and where stone fruit have been grown particular attention must be paid to any mummified fruit, either on the trees or on the ground. These too should be burnt, as they carry the over-wintering bodies of the brown rot fungus (*Sclerotinia fructicola*).

Spraying

In the spraying of fruit trees care is essential. Sprays are applied mainly to prevent diseases and there should be no gaps in the applied cover to allow entry of pests or diseases. Sprays are divided into two groups, fungicides and insecticides. Fungicides attack fungous diseases and insecticides kill insect pests.

Fungicide sprays should be applied at short intervals early in spring, when fungous diseases are most dangerous because of the fairly cold, wet conditions which often prevail then and because the growing parts of the trees are tender and soft. As the weather becomes warmer and drier and the new wood hardens fewer sprays need be applied and their strength can be reduced. On the other hand insects, which are inactive because of the cold weather in early spring, become more active as temperatures become higher. For this reason, when the frequency of fungicide sprays is being reduced insecticides should be applied more often.

Because of the risk of killing bees insecticides should never be applied to fruit trees in blossom. Home orchardists should wait until all the petals have fallen.

Bladder Plum and Leaf Curl

Two of the most troublesome diseases attacking stone fruit in the home garden in springtime are bladder plum (*Taphrina pruni*) and leaf curl of peaches and nectarines, *Taphrina deformans*. Both diseases gain entry to the plant when the bud scales loosen in very early spring.

Bladder Plum

Bladder plum, a disease appearing regularly each spring in many home orchards, is common on Japanese plum varieties, but only occasionally attacks European varieties.

The first sign of infection usually noticed is the inflated, distorted fruits, but at this stage nothing can be done to save the crop. A knowledge of the disease and its life cycle, however, is a major step in combating it.

Bladder plum attacks fruit, leaves, flowers, and shoots. Infected fruits become inflated, elongated, twisted, and spongy. When they are cut open they are found to be hollow, as the

Heading photograph by Steele.

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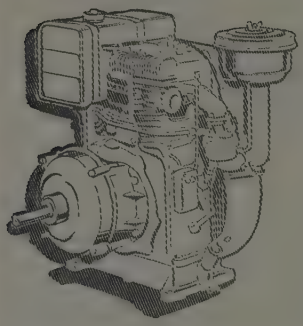

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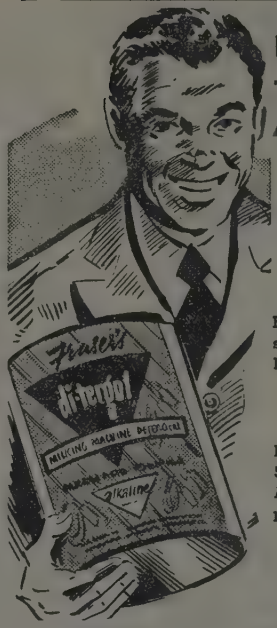

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stones have failed to develop. A change in colour from green to white accompanies the wrinkling of the fruit, which eventually turns brown and falls.

European varieties of plums if affected do not become distorted, but the change of colour from green to white occurs, often accompanied by blotches of red. The fruits, like the Japanese varieties, are hollow.

When blossoms are attacked they are killed soon after emerging from the buds. Young leaves show symptoms of infection as soon as they unfold from the buds. Their appearance is very similar to that of peach leaves infected with leaf curl, and before very long they turn brown and fall.

Shoots are regularly infected, showing a somewhat lighter colour than normal and often swellings and distortion. Sometimes the tips of shoots are killed. Laterals developing below these carry the infection into the next season.

Asci or spore-bearing bodies form a delicate bloom on the surfaces of fruits infected with bladder plum. Spores discharged from the asci are carried by wind to adjoining trees and may infect these. New infections are thought to occur in this way.

The fungus is carried over from season to season in infected shoots. In early spring it grows through the stem into developing fruits, where its presence between the cells of young fruits stimulates the cells into excessive growth, causing the external symptoms of distortion.

Leaf Curl

The disease leaf curl of peaches and nectarines is very closely related to bladder plum, differing only slightly in its life cycle. However, the disease is rarely carried over in shoots. Infection takes place through the buds each spring. The leaves become infected as they emerge from the buds and the leaf cells are stimulated to excessive growth by the fungus, producing the discoloured and contorted leaves seen in many home orchards.

Where there is a very heavy infection a tree may lose all of its first leaves. These are replaced by new leaves, which in a normal season are not reinfected, as the warmer, drier conditions of summer are not conducive to leaf curl disease. However, the loss of first leaves and the subsequent drain on the vigour of the tree through the loss of available sunlight while the second set is growing are usually reflected in a poor crop or poor fruit. Often this effect is carried through to the following season.

Control

A spray of Bordeaux mixture 5 : 4 : 50 should be applied as soon as the buds begin to swell but before they begin to expand, and should be followed by a second spray of this strength 10 days later. Four gallons of Bordeaux mixture of this concentration can be made by mixing 6½oz. of copper sulphate and 5½oz. of hydrated lime with 4 gallons of water.

[*W. D. Reid*

The distorted, spongy fruits caused by bladder plum disease on a Japanese plum.

As bladder plum is perpetuated by infected shoots, a major step in control is to remove such infected parts. Pruning should be done while the diseased fruit is still present, because this gives a guide to the sites of the disease and the amount of wood to be removed.

Leaf curl of peaches and nectarines is rarely carried in shoots; therefore no useful purpose would be accomplished by the type of pruning just recommended as a control for bladder plum. The spray at bud movement is the only known form of control for leaf curl, but if the spray is to be effective, it must be applied at the correct time.

Vigorous trees seem able to resist the disease and regular applications of nitrogenous fertiliser increase resistance to infection and to some extent help an infected tree to recover.

Manures

Manures are best applied to fruit trees before spring growth begins, as this gives the fertiliser time to become available to the trees by the time growth starts. If a dressing has not been given, an application now will help the tree to carry the crop to maturity. The quantity and quality of fruit produced in the home orchard depend largely on the fertility and management of the soil.

Definite recommendations as to the quantity of any particular fertiliser required are difficult to make, as requirements differ in various districts and according to soil types. However, the three main elements required by fruit trees are nitrogen, phosphate, and potash, and the application of a balanced fertiliser containing all these elements is essential in all home orchards if good crops are to be maintained.

Nitrogen is essentially a growth element. It promotes strong wood growth and large foliage and can assist in fruit set. Nitrogen is needed most in the early part of the growing season, and often at this period there is likely to be a deficiency, especially if a green crop has been dug in and has not had sufficient time to rot down. Too much nitrogen, on the other hand, causes soft, sappy growth, often at the expense of the crop.

Phosphate is valuable to the plant in the early stages, as it stimulates root activity and influences fruit bud development.

Potash improves plant fibre and builds up resistance to disease. One of the many important functions of potash is that it counteracts the effect of excess nitrogen, slowing down and hardening sappy growth caused by such an excess. Potash also improves the colour and keeping quality of fruit.

Phosphate and potash are both taken up by trees in greater proportions during the early stages of development in spring.

A suitable mixture for the home orchard to give the elements required is blood and bone, superphosphate, and sulphate of potash in a 6 : 3 : 1 ratio by weight. For late manurial treatments, where growth has already begun, half the blood and bone could be replaced by sulphate of ammonia, which becomes available to the trees more quickly. In determining the quantities to be applied the health and age of individual trees must be taken into account. The tree itself is a good

Sprays for Control of Insect Pests and Diseases in the Home Orchard

APPLES AND PEARS

Time of application	Treatment	Pest or disease
Buds showing green tips	Bordeaux mixture (6oz. of copper sulphate and 5oz. of hydrated lime to 4 gallons of water) or lime sulphur (1½ pints to 4 gallons of water)	Black spot
Petal fall	*Lime sulphur and D.D.T. (¼ pint of lime sulphur plus ½oz. of D.D.T. 50 per cent. wettable powder to 4 gallons of water)	Black spot, powdery mildew, codling moth, bronze beetle
†3 weeks later	‡Lime sulphur and D.D.T. (¼ pint of lime sulphur plus ½oz. of D.D.T. 50 per cent. wettable powder to 4 gallons of water)	Black spot, powdery mildew, codling moth, bronze beetle, leech

* Bordeaux mixture 3 : 4 : 50 strength (4oz. of copper sulphate and 5oz. of fresh hydrated lime to 4 gallons of water) may be used on pear trees in place of lime sulphur sprays.

† Repeat this spray at intervals of about 18 days until a month before the apples are ready to pick.

‡ If leaf-roller caterpillar is troublesome, use arsenate of lead (1½oz. plus 2½oz. of hydrated lime to 4 gallons of water) instead of D.D.T.

In late spring woolly aphis may become troublesome and sprays of any preparations for control of it listed on the opposite page may be used.

In January or February summer oil (¼ pint to 4 gallons of water) may have to be applied to control red mites. Two sprays 10 to 12 days apart are necessary. Oil sprays must **not** be applied sooner than 14 days before or after sulphur sprays. Instead of summer oil one of the insecticides listed on the opposite page may be used at the recommended strength.

Peach lateral infected with leaf curl.

STONE FRUITS*

Time of application	Treatment	Pest or disease
Bud movement of leaf buds	Bordeaux mixture (6oz. of copper sulphate and 5oz. of hydrated lime to 4 gallons of water)	Leaf curl, shot hole, bladder plum, brown rot

Repeat the above spray in 7 to 10 days at 4oz. : 5oz. : 4 gallons strength where leaf curl has been particularly severe in past seasons or when the weather is cold and wet after the first spray.

†Before blossoms are fully open	Lime sulphur and colloidal sulphur (¼ pint of lime sulphur plus 1½oz. of 40 per cent. or 2½oz. of 25 per cent. colloidal sulphur to 4 gallons of water)	Brown rot, shot hole, leaf rust

* Lime sulphur sprays should **not** be applied to apricots, as their foliage does not tolerate this spray. A 3 : 4 : 50 Bordeaux spray (4oz. of copper sulphate and 5oz. of hydrated lime to 4 gallons of water) should be applied instead.

† Repeat at intervals of 3 to 4 weeks until 3 weeks before picking. Where leech (pear or cherry slug) is troublesome apply D.D.T. (50 per cent. wettable powder at ½oz. to 4 gallons of water). If aphides are present, lindane emulsion (1 fl. oz. to 4 gallons of water) should be added.

Brown Rot

In home orchards where brown rot has been particularly troublesome use of one of the newer spray materials which have shown great promise under trial may be valuable. These sprays (see the list of certified materials on the opposite page can be used with safety on apricots. A suitable spray programme is:—

Time of application	Treatment	Remarks
During flowering season	Dichlone (½oz. to ¾oz. of 50 per cent. material to 4 gallons of water)	Do not mix with summer or winter oil
Rest of the season at 2- to 3-weekly intervals	Captan (1oz. to 2oz. of 50 per cent. material to 4 gallons of water)	Do not mix with summer or winter oil, Bordeaux mixture, or lime sulphur

CITRUS TREES

Time of application	Treatment	Pest or disease
Petal fall of main blossom	Bordeaux mixture (4oz. of copper sulphate and 5oz. of hydrated lime to 4 gallons of water)	Verrucosis and other fungous diseases

Spray in October, November, and December with the same mixture if verrucosis has been troublesome.

Early February	Summer oil (1 pint to 4 gallons of water)	Scale insects, sooty mould
Late May	Bordeaux mixture (as for petal fall of main blossom) plus summer oil (as above)	Brown rot, hard wax scale

BERRY FRUITS (Except Strawberries)

Bud movement	Bordeaux mixture (6½oz. of copper sulphate and 5oz. of hydrated lime to 4 gallons of water) plus 1oz. of arsenate of lead	Leaf spot, botrytis, leaf-roller caterpillar
Fruit set	Bordeaux mixture (5½oz. of copper sulphate and 5oz. of hydrated lime to 4 gallons of water)	Leaf spot, botrytis
After harvest	Bordeaux mixture (as above)	Leaf spot

STRAWBERRIES*

Pre-planting (foliage dip)	Bordeaux mixture (3oz. of copper sulphate and 3oz. of hydrated lime to 4 gallons of water)	Leaf spot
Mid-August, Mid-September, Mid-October	Repeat above spray	Leaf spot
After harvest	Repeat above spray as required at monthly intervals	Leaf spot

* If red spider mites are troublesome, spray with one of the certified materials in the list on the opposite page.

Certified Spray Materials

THE Plant Diseases Division of the Department of Scientific and Industrial Research has certified the following spray materials which can be used in the home garden spray schedule. This is not a complete list of all certified therapeutants. It shows only those therapeutants which may be used in the spray programmes to control pests and diseases affecting home orchards.

With all these materials the directions of the manufacturers must be followed with care. For any lines which present unusual health hazards the manufacturers are required by law to have warning notices on the labels. In the handling of such materials the **utmost care** must be taken.

In the list the materials do not appear in the same order as in the Plant Diseases Division's list (January 1955), but have been arranged for the convenience of home orchardists.

INSECTICIDES (w.p. = Wettable powder)

Purpose	Trade name of product
Control of chewing insects such as leaf-roller caterpillar, codling moth, vegetable weevil, tomato grubs, grass-grub larvae, and raspberry bud moth	**Acid Lead Arsenates (w.p.):** "Blue Bell" "Cooper's Arsinette" "Fertona" "Hemway" "Lunevale" "Orchard Brand" "Talbot" "Winstone's Arsenate of Lead"
Control of susceptible species of chewing and sucking insects, such as citrus leaf-roller, dicky rice weevil, bronze beetle, brown beetle, grape mealy bug, codling moth, apple leaf hopper, tomato grub, tomato white fly, green vegetable bug, white butterfly, diamond-backed moth, vegetable weevil, and grass-grub	**D.D.T. (w.p.):** "DeDeTane" "D-Spray 50" "Pespruf 50" **D.D.T. (pastes):** "Atapest" "DeDeTane" **D.D.T. (emulsions):** "Trimort Wettable DDT" "DD Temul" "Pespruf 20 Miscible Oil"
Control of susceptible species of chewing and sucking insects, such as apple leaf-roller and other pests listed against D.D.T.	**D.D.D. (w.p.):** "Micronizer DDD-25"
Control of red spider mite on apples	**"Aramite"**
Control of susceptible species of sucking insects, such as red mite, red spider, aphides, green vegetable bug, and thrips	**H.E.T.P.:** "Hexone"
Control of susceptible species of sucking insects, such as red spider mite, aphides, and green vegetable bug	**Parathion (emulsions):** "Folidol E605" "Fosferno 20" "Murphos" **T.E.P.P.:** "Murphy Tepp"
Control of sucking insects, such as aphides	**Nicotine sulphate:** "Black Leaf 40" "Black Spot" "Britnico" "P.B.I. 40" "Nicoforty" "Nicotox 40"
Control of sucking insects, such as scales, red spider, and red mite	**Summer ("white") oils:** "Avon Emulsifine" "Gargoyle White" "Shell White Spray" "Volck 92 Medium"
Control of sucking insects, such as scales, red spider, and red mite in dormant season	**Winter ("red") oils:** "Avon Emulsifine" "Gargoyle Red" "Gargoyle Winter Spray Emulsion" "Shell Palespray" "Shell Red Spray" "Shell Winterspray" "Winter Volck"
Control of green, black, and grey aphides	**Gamma B.H.C. (lindane) emulsions:** "Nexa"
Control of woolly aphis on pip fruit, aphides, and wireworms in soil (by seed dressing)	**Gamma B.H.C. (lindane) w.p.:** "Gammexane 25" "Isotox" "Micronizer Lindane 25" "Nexa 16%" "Verindal Ultra"

. . . CONTROL OF PESTS AND DISEASES

Purpose	Trade name of product
Control of woolly aphis on pip fruit, cabbage aphis, etc.	**Gamma B.H.C. (lindane) paste:** "Lindoloid 40" **Gamma B.H.C. (lindane) emulsions:** "Lethalin"
Control of woolly aphis on pip fruit	**B.H.C. (mixed isomers) w.p.:** "Dipac BHC" "Micronizer BHC"

FUNGICIDES

Preparation of Bordeaux mixture	**Copper sulphate:** "Te Papapa"
Preparation of horticultural sprays	**Hydrated lime:** "Dyserth" "Hindlym" "Limbux"
Control of fungous diseases, such as apple mildew and black spot, and sucking insects, such as scales	**Lime sulphur:** "Lawrys"
Control of black spot and powdery mildews	**Colloidal sulphurs (pastes):** "Colsul 40" "Red Star" "Sulphaloid"
Control of black spot of apples and grey mould of tomatoes	**Thiram (w.p.):** "Fernside" "Tetram" "Thirospray"
Control of black spot of apples and brown rot of peaches	**Captan (w.p.):** "Flit-406 Plant Fungicide" "Orthocide 50"
Control of black spot of apples	**Ferbam (w.p.):** "Fermspray" "Fertram"
Control of black spot of apples in applications not later than second cover spray	**Phenyl mercury chloride (w.p.):** "Ascospray" "Venturicide"
Control of brown rot of peaches	**Dichlone (w.p.):** "Phygon XL"
Control of ripe spot of apples	**Ziram (w.p.):** "Fuclasin Ultra" "Zirospray"

Right—Brown rot. Mummified fruit on branch at left and cankers on two twigs at right.

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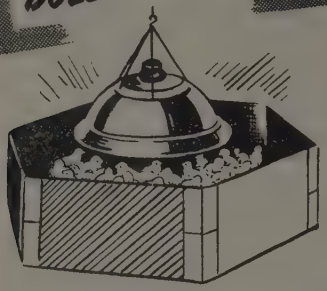

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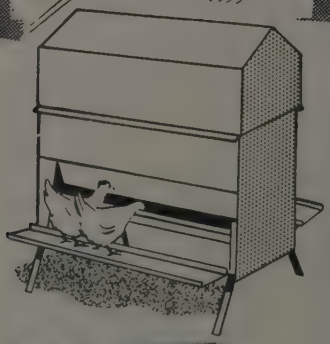

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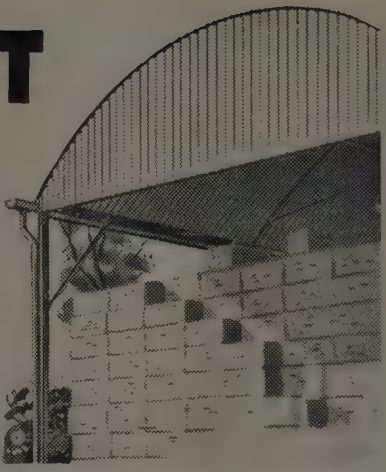

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indication if allowance is made for the fact that not only must the present crop be matured but that provision has to be made for new wood and fruit buds for future crops. Trees not yet in full bearing may require only about 3lb. to 4lb. per tree, but larger trees with little growth and poor crops may need up to 10lb. per tree.

Liming

Lime provides the element calcium, but also improves the texture of heavy soils, making them easier to work. Another useful action of lime is reducing or neutralising soil acidity. As most New Zealand soils are slightly acid, lime can be applied with safety every third year at about 4oz. to the square yard.

Thinning

Once steps have been taken to prevent diseases and pests from gaining a hold in the orchard the home fruit grower must take steps to control the size of the crop and of the fruit itself. A few varieties have a habit of producing heavy crops every second year and in off years very light crops or no fruit. Generally trees left to carry all the fruit they will set year after year will suffer eventually. A controlled reduction of crop is usually necessary, and though the number of buds may have been reduced during pruning, each bud has more than one flower, the number of flowers per bud varying according to the variety of tree.

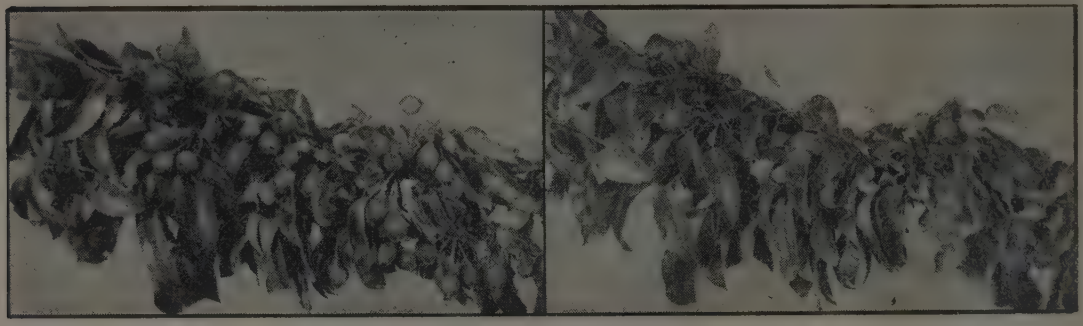
With the vagaries of fruit set there can be either a mass of fruit covering the fruiting branches (a crop far too heavy for the tree to develop to a reasonable size) or there can be patches of fruit in clusters with bare areas and little fruit between. In each

[R. W. Orr

Upper—Plums can set very heavy crops. Lower—Thinning on most plums should be heavy to obtain good fruit size.

[R. W. Orr

Upper—A heavy set of apples before thinning. Lower—Fruit after being thinned.



Left—Winter Cole pears before thinning. Right—After being thinned. [*R. W. Orr*

instance disease and pest control becomes very difficult and fruit size is restricted if the crop is not thinned.

The aims of thinning are to improve fruit quality by making disease and pest control easier and to increase fruit size. When thinning is being done the size to which the fruits are likely to grow affects the number left in each cluster. With heavy crops, such as those shown in the illustrations on page 127 and above, one fruit per cluster is sufficient, but with lighter or patchy crops two fruits may be left.

When varieties with short stalks, such as some stone fruit and Gravenstein apples, are being thinned care must be taken not to knock all the fruit from a cluster by clumsy handling. In commercial orchards thinning is done by workers experienced in this operation and the stalk of the fruit is nipped between the thumbnail and forefinger. The home orchardist, however, may find it more convenient to use the type of snips which are used for thinning grapes or a pair of sharp-pointed scissors. Thinnings should be collected and buried or burnt, as disease such as black spot and brown rot can be spread if they are left on the ground.

Pedigree Sow Records

Contributed by the Animal Industry Division

In the period January to June 1955 the following breeders had litters recorded as shown:—

Owner's name and address	Herd book number		Number of pigs		Litter weight		Litter grade*
	Sow	Sire	Born	Weaned	3 weeks lb.	8 weeks lb.	
Wessex Saddleback							
Clark, N. M. and F. S., R.D., Waimana	12	8	9	9	123	413	1
Berkshire							
Pohangina Pig Club, R.D., Ashhurst	28097	28934	8	7	77	233	5
Ridgley, E., and Son, No. 3 R.D., Coast Road, Waiuku	28636	25851	8	8	75	259	5
Ridgley, E., and Son, No. 3 R.D., Coast Road, Waiuku	27820	25851	12	11	101	334	2
Large White							
New Plymouth Boys' High School, P.O. Box 187, New Plymouth	11479	11403	9	8	119	341	2
New Plymouth Boys' High School, P.O. Box 187, New Plymouth	11478	10368	11	11	148	449	1
Johnson, L. A., P.O. Box 34, Murchison	12279	11631	13	11	151	487	1
Knight, H., 4th Avenue, Levin	11925	12083	11	11	141	454	1
Bull, M. E., P.O. Box 2, Patutahi	11068	12425	12	11	137	422	1
Large Black							
Thompson, R. H., Green Road, Kopane R.D., Palmerston North	6365	6309	11	10	156	409	1
Thompson, R. H., Green Road, Kopane R.D., Palmerston North	6364	6309	15	9	143	376	1

Minimum Litter Weight for Grades

Grade*	3 weeks (lb.)	8 weeks (lb.)
1	120	360
2	100	300
3	90	270
4	80	240
5	70	210

Breed Averages for the Period under Review

Breed	Number of litters recorded	Number of pigs		Litter weights		Average weight per pig	
		Born	Weaned	3 weeks lb.	8 weeks lb.	3 weeks lb.	8 weeks lb.
Wessex Saddleback	1	9	9	123	413	13.9	45.9
Berkshire	4	9.5	8.7	79	257	8.7	29.5
Tamworth	1	5	5	50	176	10.0	35.2
Large White	5	11	10	139	425	13.6	41.4
Large Black	2	13	9.5	149.5	392.5	15.7	41.3

* A No. 3 grade is classed as good, No. 2 as excellent, and No. 1 as special.

Sledge for Shifting Large Stones

By C. J. CROSBIE, Machinery Instructor, Department of Agriculture, Christchurch

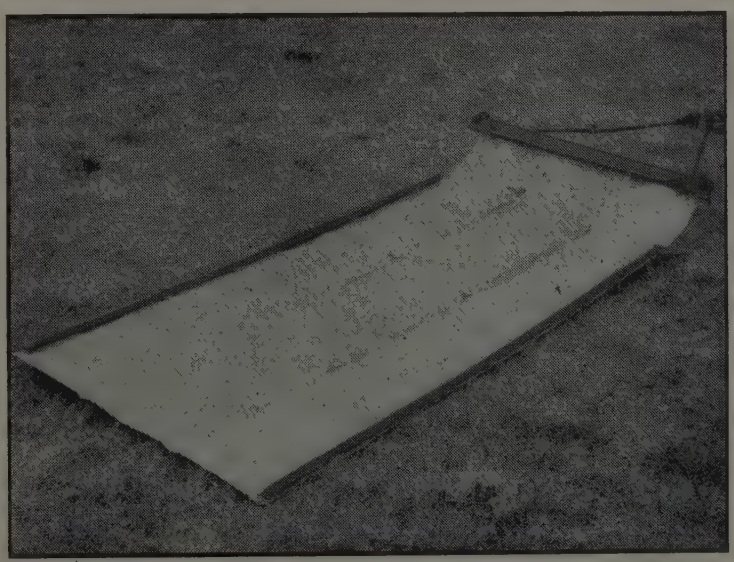
LAST year when an experimental area was being developed at Broken River near Cass the initial ploughing turned up a number of large boulders the removal of which was made easy by the use of the stone sledge described and illustrated here.

STONES up to 1cwt. can be lifted on to a trailer by one man, but those that require a two-man lift are yet so small that two men cannot get over them to start the lift without bumping their heads together. Further, the rounded edges provide poor grip with consequent danger to feet and toes. The sledge described required no lifting of the stones.

It was constructed from a reject 44-gallon steel drum bought from an oil company. The ends were first cut off and the barrel split down the seam. The barrel was flattened except for the front, which was left turned up by the natural curvature of the drum. A piece of 2in. x 2in. x ¼in. angle iron was welded across the front for rigidity and drilled to provide anchorage for the draw rods or chains. Two lengths of 1in. diameter round rod were welded down the sides for further rigidity and proved useful to prevent stones sliding off when in transit across a field. A further rod welded across the tail of the sledge would also assist in this.

The sledge was drawn by a medium tractor to each large stone and either one or two men rolled the stone on to the sledge. Large stones deeply buried in the soil were first pulled out by the tractor and a chain and then rolled on to the sledge. Some smaller stones were carried to the sledge and placed on top of the larger ones to

HEADING PHOTOGRAPH: One man can handle quite large stones without lifting them.



The sledge, made from a reject 44-gallon drum.

SLEDGE FOR MOVING LARGE STONES

Big stones too heavy to roll are pulled out of the ground by chains.

complete the load, which was then sufficiently heavy to require low gear work to draw it away. Unloading was facilitated by pulling the sledge on to the side of a small mound or on to two or more stones dumped earlier so that the sledge was canted and the load could be rolled down the slope.

The sledge removed the stones from 7½ acres in a little over half a day and showed little wear on its under side from friction on the soil, but its life is limited and sledges for larger areas would be best constructed from heavier plate steel. Much of the additional cost would be offset by the saving in labour of not having to flatten the drum. The sledge illustrated was made by a local engineer for £3 from a reject steel drum which cost 15s.

Some areas are so stony that the use of such a sledge would make little impression on them, but the sledge would be useful for removing odd large stones on farms on foothills and glacial flats, for the removal of heavy tree stumps and the like, and for the transport and installation of concrete water troughs.

If one side of the sledge is drawn up on to a couple of stones, unloading is easier.

Sudden Death of Mr. C. C. Leitch

THE death occurred suddenly at Hamilton early last month of Mr. Colin Campbell Leitch, Fields Superintendent, Department of Agriculture, Christchurch. He was born at Ngahere, Westland, and was 53 years of age.

Mr. Leitch had an intimate knowledge of all branches of farming in Canterbury. He had been associated with the Department's seed certification scheme since its inception, and he had extensive knowledge of seed potatoes and grass, white clover, and Montgomery red clover seed. In recent years he worked indefatigably to develop sound irrigation farming practices and to extend the area under irrigation. His work has undoubtedly laid the foundation for the development of irrigation in Canterbury.

Mr. C. C. Leitch.

He was associated with the linen flax growing industry during the Second World War, was a regular lecturer at farmers' gatherings and field days, and was frequently a judge at root crop and pasture competitions. He also took a keen interest in the work of Young Farmers' Clubs.

He held the Diploma of Agriculture of Canterbury Agricultural College and in 1953 he was elected to be a graduate representative on the Board of Governors of the college. He joined the Department in 1928 and 2 years later became an Assistant Instructor in Agriculture at Christchurch. In 1934 he was appointed Instructor in Agriculture, and in 1936 he was transferred to Timaru. When he left Timaru in 1946 to become Assistant Fields Superintendent at Christchurch tributes were paid to his work in the South Canterbury district by representatives of farmers' bodies and seed and grain interests.

Mr. Leitch was appointed Fields Superintendent at Christchurch in 1949, succeeding the late Mr. R. P. Connell.

The Home Garden in September

SPRINGTIME is seed sowing time and in nearly all gardens much seed sowing is done in September. Even in the colder districts the ground is warm enough for the seed of all hardy plants to grow satisfactorily, and in a few of the specially favoured districts even frost-tender plants such as dwarf and runner beans, cucumbers, pumpkins, marrows, and squash can be sown outside. In this article A. G. Kennelly, Horticultural Instructor, Department of Agriculture, Dunedin, discusses work in the vegetable garden in September.

EARLY or late in September, according to the district, tomatoes, celery and celeriac, capsicum, Cape gooseberries, egg plants, melons, and cucumbers can be sown under glass, though in most southern districts or where the last killing frost may occur as late as the first or second week in November, there is no hurry yet to sow seed of cucumbers, marrows, pumpkins, and squash for growing outdoors. Seed of brussels sprouts, leeks, and cauliflower can be sown in most districts in the open.

Though generally the most important work is seed sowing, the setting out of plants raised from seed sown earlier will also be important in many gardens. The setting out now of well-grown plants raised under glass is the only way by which home gardeners in some districts can avoid the break in continuity of supply which is liable to occur after the finish of early spring crops which were set out in autumn or winter.

Seedlings of silver beet, lettuce, summer cabbage, and cauliflower can be set out or gaps can be filled in earlier planted crops. Early planted potatoes will need protection from frost and a successional planting can be made. Except in favourable situations, the planting of the main crop is best deferred until the first or second week in October.

Tubers of Jerusalem artichokes can still be set out. In exposed situations broad beans may require support, which can be provided by strings tied at suitable heights to stout stakes placed at 5ft. to 6ft. intervals along the sides of the bean rows. In many districts peas will need protection from birds. Netting or cotton stretched over the rows is effective, though a dusting of lime, superphosphate, or sawdust or similar substance is occasionally satisfactory.

Soil Fertility

Though soils vary in their capacity for sustained high production, all soils under continued cultivation sooner or

Heading photograph by Green and Hahn.

[*Green and Hahn*

Cabbage is one of the principal vegetables grown, and in most home gardens spring cabbage helps to bridge a gap which occurs after the winter greens are finished and before the first spring or early summer vegetables are ready.

later begin to decline in fertility unless a programme is followed which includes rotation and the addition of suitable organic matter such as farmyard manure, heavy green crops, compost, straw, leafmould, or sawdust, preferably supplemented by balanced mixtures of artificial manures. The stage at which the decline is checked or fertility is rebuilt depends on the skill and knowledge of the cultivator and the facilities at his disposal.

Most fairly large, well-worked home gardens in New Zealand could be kept in a state of high fertility by the addition annually of about a ton of good organic matter such as farmyard or stable manure. That means an annual dressing of about 7lb. a square yard, and for a garden of about 1/16 acre is much more than is practicable for the majority of home gardeners, most of whom have to rely on the growing and digging in of green crops and the digging in of gardens and suitable household residues.

The steady decline in the amount of organic manure available, together with a greater awareness of the nutritional value of vegetables and a consequent greater demand for more and and better vegetables, led to considerable research into the problem of the maintenance of a high standard of fertility on intensively cultivated land. It was found that where the soil was in reasonably good condition it was most economic to apply moderate quantities of farmyard manure (about 3lb. to 5lb. per square yard annually) or similar organic matter supplemented by artificial (usually mineral) fertilisers. Most crops produce their highest yields when manured in this way.

Manuring of vegetable crops will be discussed in detail in a subsequent home garden article.

Artichokes

Artichokes are easily grown and are well worth a place in gardens having sufficient space. The tubers (either cut or whole) should be planted 3in. to 4in. deep and 15in. to 18in. apart in rows 3ft. apart. Three pounds of small tubers will plant about 100ft. of row.

Artichokes are very hardy and do not require any particular type of soil, though they do well in fertile, well-worked loams. They are rarely troubled by pests and diseases.

Asparagus

Established asparagus beds should be kept weed free and may be fed with liquid manure made from organic material such as farmyard or poultry manure. Alternatively nitrate of soda or sulphate of ammonia at 1oz. to 2oz. a square yard is likely to give good results. Dried blood can be used, but on light, sandy soils lacking in organic matter late dressings of dried blood sometimes give a rather musty flavour to the shoots when cooked.

It is not too late to plant new asparagus beds, particularly in the south, but no time should be lost, as the young seedlings may be checked. The ground should be prepared by being deeply dug and cleared of weeds. Good drainage is essential and field drains should be installed if the condition of the ground warrants their use.

Though asparagus succeeds in light soil deficient in organic matter, young plants establish better in beds that have been dressed with well-rotted organic matter some time before planting. One-year crowns are best. Plants should be set out as advised in last month's "Journal".

Beetroot

Detroit Dark Red is a good variety of beetroot for sowing now. The danger of the crop developing a high percentage of premature seed heads owing to too prolonged low temperature is now past.

Beet does well in ground that was heavily manured for a previous crop,

but a complete fertiliser is likely to give the best results on most soils, because it has been shown that fertiliser that produces the highest yield of beet also produces the most succulent roots. Such roots lose their succulence more slowly after harvesting than do roots of unfertilised plants or roots of plants fertilised with material containing only a single element such as nitrogen, phosphorus, or potash.

Beetroot usually responds best to a neutral or slightly acid soil and roots are often scabby on alkaline soils.

Lack of good colour in beetroot (and silver beet) is usually due to lack of nitrogen, and this may be corrected by applying nitrate of soda, sulphate of ammonia, or dried blood at about an ounce to the square yard. Common salt often improves growth and texture of beetroot.

Sowing

Rates of sowing for beetroot vary according to the germination percentage, variety, and purpose for which the crop is intended, but as beet "seed" is a fruit containing from 2 to 6 seeds, each of which may develop into a plant, sparse seeding is usually best. Rates of sowing vary from about 1oz. to 3oz. per 100ft. of row. In most home gardens, where the percentage of germination is unpredictable, owing to either seed or soil condition, 10 to 15 seeds per 1ft. of row usually gives satisfactory results. Seed should be sown in rows 12in. to 18in. apart according to the size of the tops of the mature plants and about ½in. deep in heavy and up to 1in. deep in light soils.

Thinning of seedlings is usually necessary to produce the best crops; the first thinning should remove the excess from groups of seedlings that have arisen from a single "seed". Additional thinning may be necessary later and the young plants thinned can be used as greens. Beetroot seedlings transplant well when small and the area of crop can be increased by transplanting.

Brussels Sprouts, Broccoli, Summer Cabbage, Cauliflower

An early sowing of brussels sprouts can be made late this month. Many home gardeners in the warmer and drier parts of New Zealand consider brussels sprouts difficult to grow because of attacks of grey aphides. Regular spraying with nicotine sulphate (1oz. to 4 gallons of water plus ½oz. of soft soap) should ensure that the plants are kept clean.

However, spray coverage must be complete and if possible a hot, still day should be chosen for the application of nicotine sulphate. Lindane or H.E.T.P. at recommended strengths may be more efficient. When nicotine sulphate or H.E.T.P. is used the precautions listed on the package should be observed meticulously.

Seed of brussels sprouts should be sown ¼in. deep in rows 1ft. apart. The seed-bed should be rich in humus and well worked to a fine tilth. The young plants should be ready for setting out in about 6 to 8 weeks.

An early sowing of winter cauliflower (broccoli) can, if desired, be made at the same time as the brussels sprouts, the requirements for sowing and planting out being the same. Summer cabbage and cauliflower can also be sown.

Carrots

Seed of carrots should be sown as soon as soil conditions are favourable. In most home gardens several small successional sowings are preferable to one large one. Carrots are high yielding and grow well in deep, rich, well-drained, and well-cultivated soils that contain adequate well-rotted organic matter.

When seed is sown thinly on light, free-working, sandy loams or peat soils carrots do not usually require thinning. Where thinning is necessary it can often be delayed with advantage until the plants are large enough to be used in soups, salads, or stews.

Control of Rust Fly

Where the carrot rust fly is troublesome seed should be dusted before sowing with lindane, which is marketed under several trade names. Care must be taken, too, to refirm the soil after thinning, to water the remaining roots copiously, and to remove all thinnings. The rust fly maggot, which is white, damages the roots and should not be confused with the greenish aphides which attack the foliage and are usually very numerous. Aphides may be wingless or may have transparent wings. They suck the sap and stunt the growth, so that young plants may wilt in hot weather. The

Pumpkin, marrow, and cucumber plants do not transplant well. If early plants are desired, they are best raised in containers (such as those shown) which can be removed so that the roots and soil surrounding them are left undisturbed when the plants are set out. Several seeds may be sown in each container, but it is preferable to leave only one plant to grow on.

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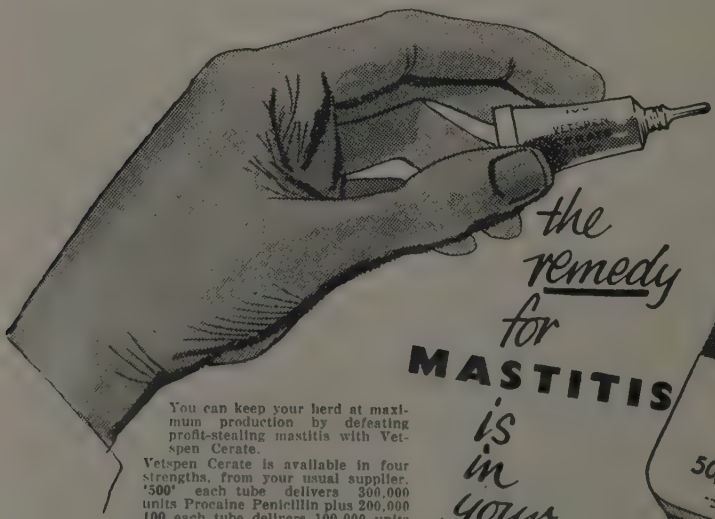

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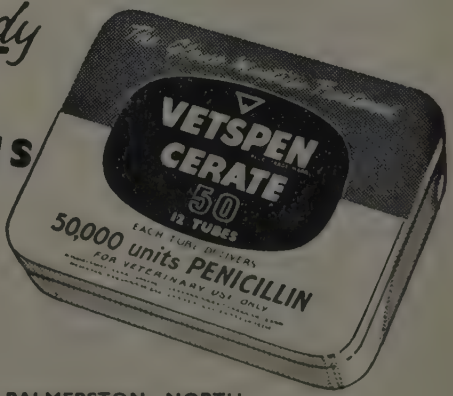

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[*Green and Hahn*

Tidiness is important in the garden. Long, straight rows that are adequately spaced and weed free make for tidiness.

many tiny white specks present are the cast skins of the aphides. The foliage may take on a bronzing or a bluish or reddish hue and the petioles become distorted.

Aphides are readily controlled by regular spraying with nicotine sulphate 1 : 600 (1oz. of nicotine sulphate to 4 gallons of water plus ½oz. of soap, which should be dissolved in a little hot water) or with H.E.T.P. at 1 : 1600 or lindane at recommended strengths. The leaves of the carrots must be thoroughly covered with spray. A still, warm day should be chosen for spraying.

Though carrots thrive in deep, rich, well-drained, well-cultivated soils, care should be taken when building up the humus content to apply only well-rotted material in limited quantity so that when it is incorporated it forms a homogeneous mass with the soil; otherwise misshapen or forked roots may result. Manure should be well rotted and the best results are usually obtained from planting in ground that was heavily dressed with organic manure for the previous crop.

It is not possible to give a formula for a manurial dressing that will give optimum results on all soils, but on most soils reasonably well supplied with organic matter, a complete fertiliser dressing should be applied at about 2oz. to 3oz. per square yard.

Though carrots are fairly tolerant of moderately acid conditions, a deficiency of lime can be remedied on most soils by the application of 2oz. to 3oz. of agricultural lime per square yard.

To ensure that germination is good the seed-bed should be worked down to a fine tilth. Seed should be sown ½in. deep in rows about 12in. apart. In heavy soil that tends to compact or where large-rooted varieties are grown plants can be thinned 2in. to 4in. apart.

Half-long carrots are preferred in most home gardens for sowing at this time of the year. Good varieties are Manchester Table (Nantes), and Chantenay. Where the soil is shallow short carrots of the Oxheart type may be preferred.

Celery

An early sowing of celery can be made now. To grow the plant successfully the temperature should be maintained at well above 50 degrees F. Seed should therefore be sown under glass early in the season, though outdoor sowing is satisfactory later in favoured districts or warm situations.

A celery "seed" is very tiny and the embryo within is minute and relatively weak. Consequently germination is usually poor unless conditions are very favourable. Seed should therefore be sown in a fine, moderately rich, specially prepared soil. When the seedlings are large enough to handle they should be pricked out about 2½in. each way into the boxes from which they will ultimately be set out in the garden. Plenty of ventilation is desirable and the seedlings should be kept near the glass so that they do not become drawn up.

Because of the likelihood of damage caused by the leaf spot fungus, which is often seed borne, clean seed is important. Infection can be greatly reduced, though not entirely eliminated, by steeping infected seed for 3 hours in a solution of 1 part of formalin (40 per cent. strength) to 300 parts of water (1 fl. oz. to 15 pints of water). Another method of treating the seed is to place it in a muslin bag immersed in water held at exactly 118 degrees F. for ½ hour. Afterwards the seed should be rinsed with cold water and sown while still wet.

Infected seed is usually less infective after 3 or 4 years, as the fungus loses its vitality with age. However, the seed loses much of its germinating

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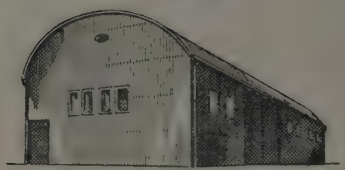

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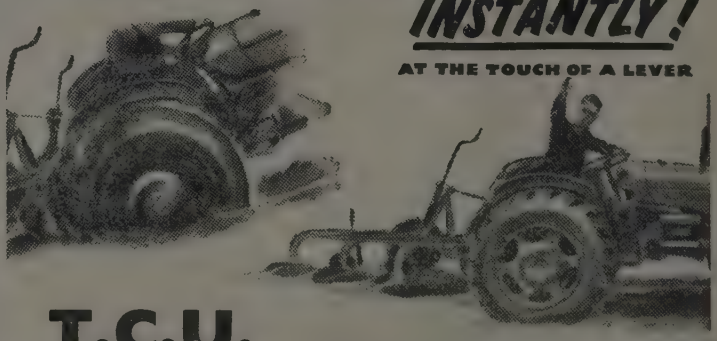

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capacity with age and the fungus may still remain alive after 8 years.

Where the fungus occurs regularly it is advisable to space the seedlings widely and to spray with Bordeaux mixture or copper oxychloride from the time of pricking out, even before the disease is seen.

Varieties: Self-blanching celery is most popular in New Zealand, and varieties such as Golden Plume and Golden Self-blanching are sold by most seedsmen. The non-self-blanching varieties are, however, well worth a trial, because their quality and flavour are very good.

Frost-tender Vegetables

A good way to obtain early crops where there is danger of frost until late October or even November is to sow such tender plants as pumpkins, marrows, and cucumbers under glass. An electrically heated hot-bed is excellent, though a hot-bed of fermenting manure, hops, or other organic material is easily made if suitable material is available.

The recognised safe dates for planting out frost-tender vegetables vary considerably in different districts. As about a month of favourable conditions is required to raise seedlings of most cucurbits to a size where they can be planted out, time of sowing must be correlated with the facilities available for raising the plants and the time of the last killing frost. It is not advisable to sow too early, as cucurbits do not transplant readily, and difficulty in transplanting and the resultant setback are greater when the plants are large.

In a few parts of the North Island frost-tender vegetables, such as dwarf and climbing beans and cucurbits, can be sown outdoors by about mid-September, but in most districts it is necessary to defer sowing until late October or even early November. Even where protection can be given against frost nothing is to be gained by sowing in cold, wet ground.

Leeks

Leeks are one of the most reliable vegetables for the autumn, winter, and spring. Though they stand well in cool, moist conditions, they send up seed heads fairly quickly if subjected to dry, warm conditions. To ensure a long season of supply it is advisable to make two or three sowings.

Because of cool soil conditions the earliest sowings in most districts are best made in a box of prepared soil under glass. Seed can now be sown outdoors thinly ½in. deep in rows 12in. apart. London Flag or Broad Flag is a good variety for sowing now, as it matures a little more quickly than either Musselburgh or Lyon, though either of these can be sown if desired.

Onions

In the South Island and in districts where main-crop onions are usually sown in spring seed should be sown as soon as ground conditions are favourable. Though varieties and cultural practices have an important bearing on production, fairly heavy soils usually produce good-keeping but relatively slow-maturing onions and sandy soils quick-maturing onions that are generally of poorer keeping quality.

Greening and sprouting of potatoes before planting are not necessary for the main crop if early potatoes have been planted to provide supplies until the main crop can be dug.

Organic matter does not have to be applied to soils that are reasonably fertile if the water-table is high and if the composition and placement of fertilisers are suitable. With onions plant food should be readily available, but in such a form and in such quantities that it does not cause burning or, paradoxically, starvation.

Onion roots arise from the stem plate at the base of the fleshy part of the plant. They are fine, but very numerous, radiating in all directions and forming a fibrous tuft. On most soils the roots are not more than 10in. to 12in. long, though occasionally they may be 20in.; they do not arise as normal plant roots, but continue to develop from the stem plate as long as the plant is growing. The main root zone is usually within 6in. of the bulb.

Onions require a slowly available source of nitrogen, and on most soils crops will benefit from a heavy dressing of stable or farmyard manure applied in autumn and to which has been added (to balance its nitrogen and potash content) about 1/30 part by weight of superphosphate. If onions of good keeping quality are required, it is not advisable to apply in spring excessive quantities of organic manure which contains a considerable amount of nitrogen, as bulbs may be stimulated into excessive leaf growth and weeds are liable to be troublesome.

Few home gardeners are likely to have much farmyard manure, but available compost should be applied with a complete fertiliser at about 3oz. to 6oz. a square yard. Because of the great variation in soils and their condition throughout New Zealand only local experience can indicate fertiliser requirements. If soil conditions and fertiliser placement are correct, it seems difficult, judging by experiments made, to over-manure onions.

The seed-bed should be worked down to a fine, firm tilth and seed sown thinly ½in. deep in rows 12in. to 15in. apart. Good varieties include Ailsa Craig and Straw Spanish (early) and Pukekohe Long Keeper for storage.

Peas

In gardens where peas have not yet been sown they should be put in without delay if soil conditions are favourable. Each pea crop can be harvested for only a limited time and successional sowings are usually advisable.

Peas do well in cool, well-drained soils rich in humus. As they repay good cultural methods, the ground should be deeply dug and manured, preferably some time before sowing, with organic material such as compost or farmyard manure. Before sowing, a complete fertiliser, or if the soil is

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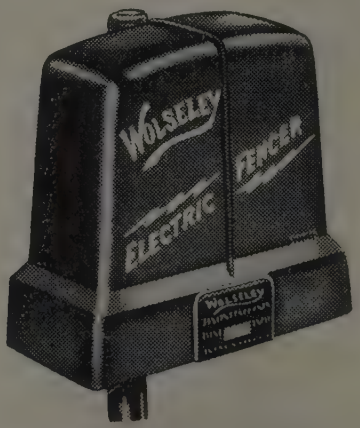

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in good condition, a dressing of 2oz. to 3oz. of superphosphate to the square yard, can be well worked into the soil. If a shallow trench is first taken out and the seed pressed into the bottom of it 1in. to 1½in. deep (according to whether the soil is heavy or light), the plants can be earthed up conveniently as soon as they show a tendency to straggle or fall over between the rows.

Dwarf varieties such as William Massey and Little Marvel can be grown without staking in rows 20in. apart if they are kept well earthed up. Rows of the mid-season varieties such as Greenfeast and Victory Freezer should be planted at least 3ft. apart and require staking. Material such as brushwood, netting, or sticks can be used. Vines must be supported so that they will not provide a refuge for slugs, which eat the pods. Staking also prevents the pods from rotting through contact with the soil. The varieties mentioned are among the best. One pound of pea seed is sufficient for about 100ft. of row.

If slugs are troublesome, they can be controlled by parametaldehyde baits, obtainable from most seedsmen.

Potatoes

It is too early in most districts to plant main-crop potatoes, though an early planting can be made if the home gardener is prepared to keep the tops earthed up while frosts are likely to cause damage. It is not necessary to green and sprout tubers before planting, but earlier crops can usually be obtained from sprouted seed.

Government-certified seed should be used. Few vegetables are subject to as many diseases as potatoes, and only the expert can recognise many diseases in the tubers. Tubers infected with virus diseases, such as leaf roll, mosaic, and crinkle, may appear healthy and of a desirable type, yet if it were not for the system of certification, these diseases would reduce the total yield of potatoes in New Zealand by perhaps a half or two-thirds. Virus diseases are transmitted mainly by aphides (green fly), the lower incidence of which in the South Island is the main reason for the growing of most of the certified seed there.

Apart from the purchase of certified seed, the important points in potato growing are choice of variety suited to the district and the purpose for which the variety is grown (that is, early, second early, main, or late crop), soil condition, and cultivation. Soil can be maintained in good condition by the addition of humus or humus-forming materials, by the judicious application of fertiliser, by suitable rotation crops, and by drainage where necessary.

The soil for potatoes preferably should be deeply and thoroughly cultivated, as thorough preparation of the soil not only ensures a good seed-bed but helps to maintain satisfactory moisture content, aeration, and temperature. Soils that have been trenched should be given time to settle before planting.

Heavy dressings of organic manure are not advisable just before planting, as they may induce conditions which favour the development of scab. A heavy dressing applied the previous year, so that it is thoroughly decomposed, or a green crop dug in some time before planting will usually help to give satisfactory results, as also will the addition of such material as grass clippings.

Soils which have been heavily limed or heavily dressed with the ashes of the garden bonfire should not be used; the potato is tolerant of acid conditions, and in soils infected with potato scab the organism will be suppressed if the soil is medium to strongly acid. Lime gives the soil an alkaline reaction.

The fertiliser required for potatoes depends greatly on the amount of organic matter previously incorporated in the soil, but generally Department of Agriculture trials in New Zealand

[*Green and Hahn*

One of the simplest ways of planting potatoes is to draw out a drill 4in. to 5in. deep, dust the fertiliser along it, set the tubers, and draw the soil in with a hoe. Deep setting is not advisable if the soil tends to be cold or wet.

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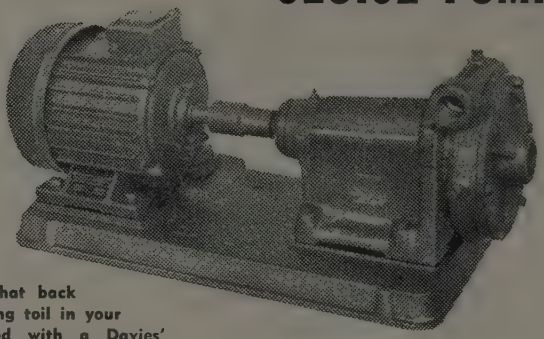

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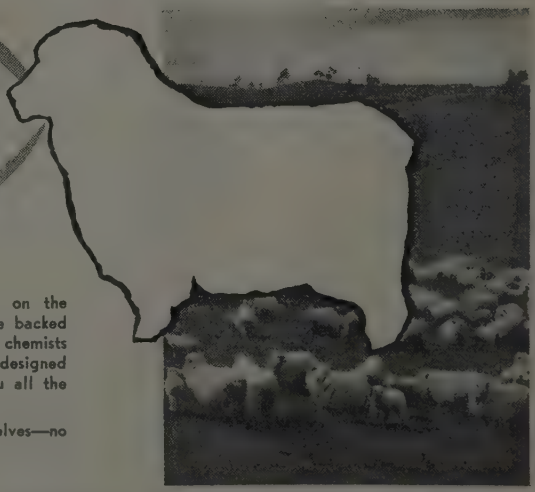

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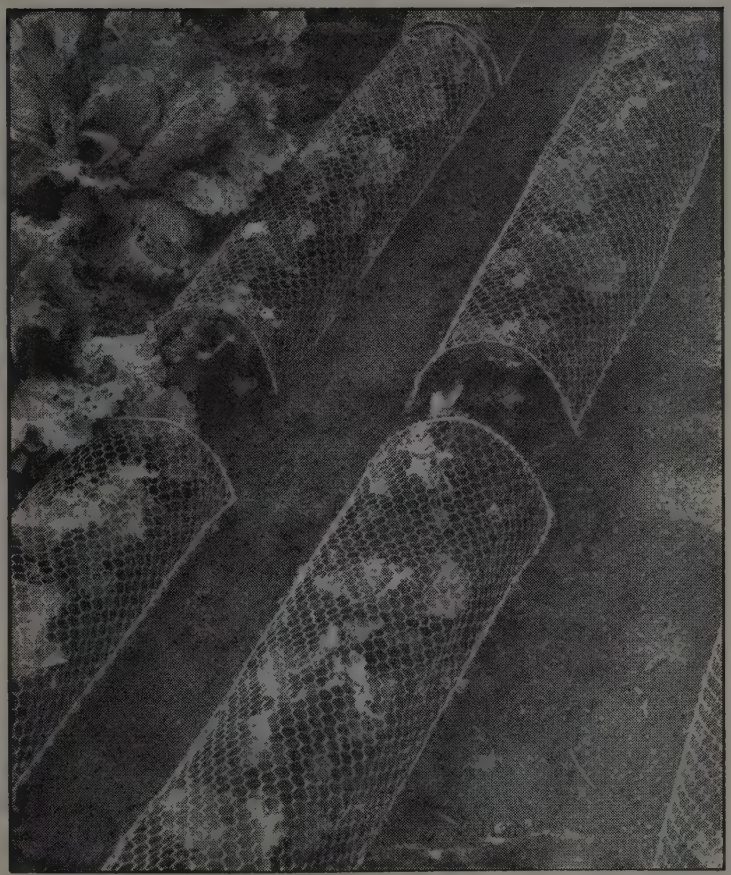
have shown that a mixture (by weight) of 1 part of sulphate of ammonia and, according to soil type, 3 to 5 parts of superphosphate applied at about 1½oz. to 2oz. per yard of row will give good results. The addition of muriate of potash or sulphate of potash, preferably the latter, at about ½oz. to a yard of row will give improved results on many soils and is advised for most home garden soils. Instead of superphosphate and sulphate of ammonia equal parts of superphosphate and blood and bone can be used.

The simplest way to plant is usually to open a trench about 4in. to 5in. deep and to dust the fertiliser along it. In the home garden rows are usually 2ft. apart and tubers can be placed from 9in. to 14in. or 16in. apart in the rows. The wider spacings are favoured for main-crop or very large growing varieties. If the tubers are large, that is, 4oz. or more, they can be cut into two or more sets if desired. Each should be chunky and have at least two eyes and a minimum of cut surface.

Cut surfaces should not be allowed to dry out, but should heal or callus over promptly. The pieces should be planted immediately they are cut in a soil that is neither too wet nor too dry, or tubers can be cut and left with the cut surfaces in contact, though they should be broken apart from time to time. Alternatively they can be kept at a temperature of 60 to 70 degrees F. and a very high humidity for about 7 to 10 days. However, to prevent excessive sprouting temperature and humidity should be lowered as soon as healing is complete. Hygiene is also very important in handling cut tubers, as the tubers are liable to attack by soft-rotting organisms until the cut surfaces heal.



[*Green and Hahn*

Bird damage to crops such as lettuce, silver beet, and peas is common in spring, when food for birds is short. The most effective protection can be given by wire netting covers.

[*Green and Hahn*

Radishes are easily grown where soil conditions are reasonably good. As radishes mature relatively quickly, they are one of the best crops to get the younger members of the family interested in garden work.

Though for early crops Epicure and Arran Banner are most commonly planted, numerous other varieties listed in good seedsmen's catalogues are suited to different districts. For example, Jersey Bennes is favoured in Otago.

Lettuce

Lettuce seed should be sown without delay, or if a sufficient period has elapsed since the last sowing, a further sowing should be made. For lettuce grown early in the season, when conditions are cool, a variety such as Imperial 410 (Triumph) or Imperial 615 (Neapolitan Winter) is especially suitable. Later, varieties such as Webbs Wonderful (New York 515) or Great Lakes can be chosen.

Seed can be sown ¼in. deep in rows 12in. to 15in. apart in well-drained, deeply cultivated soil of high humus content. Early in the season lettuce can be transplanted successfully. They are usually set out 8in. to 12in. apart. When the weather becomes hot and dry it is better to sow seed thinly where the plants are to mature and to thin seedlings to 8in. to 12in. apart.

Radish

Small successional sowings of radish should be made as required. Cultural requirements are similar to those of

beetroot and carrots, but as most varieties of radish mature much more quickly than other root crops, they are more sensitive to adverse soil conditions. The soil should be well drained and preferably light with the top 6in. cultivated to a very fine tilth. It should be very rich in fine, well-rotted organic matter; well-matured compost is excellent, though improved results are usually obtained if in addition a complete fertiliser is applied at about 1oz. to 2oz. per square yard.

Radishes usually grow best in a soil that is slightly to moderately acid. Lime is therefore unnecessary on many soils that have been limed for a previous crop, though a light dressing applied preferably some time before sowing is likely to be beneficial on soils in high-rainfall areas. The soil should be gently firmed after cultivation, as the roots do not bulb well in loose soil. The soil should not dry out and in mid-summer shelter from the sun is advisable; summer crops should be sown in the shade of taller crops.

Seed can be sown at any time of the year in well-drained soil, provided there is sufficient moisture and the ground temperature is not below about 52 degrees F. The seed should be sown thinly (about 12 to 15 seeds for each 1ft. of row) ½in. deep in rows that need be only about 6in. to 8in. apart for any except the Chinese varieties. Alternatively the seed may be broadcast, though weeding is then more difficult. If beds are too wide, it may be difficult to harvest the roots without treading on the bed.

Varieties of radishes can be grouped as oval, turnip-shaped, long, and giant or Chinese. Any of the smaller or medium-type radishes, such as French Breakfast, White Icicle, Long Scarlet, or Chartier, is suitable for sowing now.

Silver Beet, Spinach Beet, Spinach

Leaf beets and spinach are health-giving vegetables worth a place in practically every home garden. Silver beet or Swiss chard differs from spinach beet in its upright habit of growth and large leaves, which have broad, white or whitish midribs. Spinach beet is sometimes called perpetual spinach (beet) and is a form of silver beet with smaller leaves which arise from a crown. It is one of the most useful of the leaf beets, because unless conditions are very hot and dry, it will continue to develop leaves which can be plucked for many months.

Spinach is less enduring than silver or spinach beet under hot summer conditions, but is quicker maturing, as in the moist, relatively cool weather of spring, varieties of it will mature in good soil conditions in from 40 to 55 days.

The soil for all three vegetables should be moist, fertile, well cultivated, and well drained. Lime at 2oz. to 3oz. per square yard should be applied to soils not recently dressed and a good dressing of organic material such as well-rotted farmyard or stable manure in addition to a complete fertiliser is advisable on many home garden soils.

Seed should be sown about ½in. deep in rows 12in. apart for spinach and spinach beet and 15in. to 18in. apart for the upright-growing leaf beets. Any of the varieties of leaf beet can be sown now, but it is advisable to choose a variety of spinach which is fairly tolerant of warm conditions.

Damage from Watering of Frosted Crops to Prevent Injury

AN economic and ideal method of frost protection of vegetables is still to be found. However, for a number of years it has been believed that if frosted crops are watered before sun-up, no burn will result. It is possible that results have been obtained from this practice. However, the accompanying photograph illustrates what can happen if watering is carried out.

This particular lettuce area is bounded by pear trees, glasshouses, and the grower's house. Several seasons ago the grower watered two beds of frosted lettuces in the area and burn occurred. This year the grower repeated the operation on a smaller area to satisfy himself that burn would occur. The water used had been overnight. The frost in the morning standing in an unheated glasshouse was approximately 9 degrees. About 30 minutes before the sun struck the lettuce area a short length of one bed was watered through an ordinary watering can.

The close-up photograph at right shows the degree of burn on two of the lettuces. The other lettuce was from the untreated area and has been placed for comparison. A small percentage of burn did occur in the area not watered, but in the watered area practically every lettuce was affected.

—C. L. NAPIER,
Horticultural Instructor,
Department of Agriculture,
Palmerston North

[Bruce Watt

Farm Management Survey in the Southern Maniatoto Plain

STOCK management, production, and economic aspects of farm management in the southern Maniatoto Plain are considered in this second and concluding part of an article by R. C. Stuart, Agricultural Economist, Christchurch, H. Tocker, Research Officer (Farm Management), Christchurch, and A. H. Mouat, Farm Economist, Dunedin. These officers of the Department of Agriculture conducted a survey in the area of 53 farms having a combined area of 210,198 acres.

THE results of the survey are set out here and on pages 54 to 63 of last month's "Journal".

Stock Management

In southern Maniatoto fine-woolled sheep are carried for the production of wool and fat lambs. Ewes are mainly fine Romney-cross, half-bred, or three-quarter-bred with an occasional flock of Corriedales or Merinos. Replacements for the flock are bred on most farms, but a few owners buy ewe hoggets or 2-tooth ewes to maintain their ewe flocks. For the breeding of replacement stock several breeds of rams are used, including fine Romneys, half-breds, Corriedales, and Merinos. For fat-lamb production the dominant breeds are Southdown, Border Leicester, and the cross of these two breeds.

Low rainfall and high variation in temperatures and low stock carrying capacity (1.5 ewe equivalents per acre of plain) combine to make a healthy environment for sheep. Few farmers drench their lambs, as little trouble is experienced, and practically no inoculation of ewes or lambs is done, though there are some cases of blood poisoning and pulpy kidney. The general practice is to winter the ewes on lucerne hay and perhaps turnips where a surplus remains after the ewe hoggets have been satisfied. Occasionally some sheaf oats or oaten chaff may be given. On 17 of the 53 farms winter forage crops were grown, with an average of 18 acres per farm, mainly for ewe hoggets.

In Table 5 the total figures for stock illustrate the importance of the ewe flocks and replacement hoggets. The large number of other dry sheep include fine-woolled wethers run mainly on the hill country.

TABLE 5—STOCKING

Number of farms	53	
Area in hill tussock	141,867	acres
Area on plains	68,531	acres
Number of breeding ewes	56,676	
Number of ewe hoggets	16,271	
Other dry sheep	25,465	
Total sheep	98,412	
Total cattle	1,470	
Total ewe equivalents	103,799	
Ewe equivalents per acre of plain	1.5	

The stock carrying capacity per acre tends to fall as the properties increase in size. Farms with less than 1000 acres of plain have an average carrying capacity of 2.1 ewe equivalents per acre of plain; farms from 1000 to 1500 acres average 1.6, and farms with over 1500 acres average 1.1.

Flushing of the ewes before mating is not standard practice, though a few farmers do so, using lucerne, good grass, or greenfeed. Lambing begins about mid-September and rises to a peak about the first week of October. On 21 farms an average of 21 acres of greenfeed was sown for use at lambing, but the remaining 32 farms made no special provision for this period. Table 6 gives the total lambs handled in the season on these farms. The lambing percentage averaged 103 with that of individual flocks ranging from 80 to 125.

TABLE 6—LAMB RECORD FOR 1952-53 SEASON

Number of farms	53	
Total lambs tailed	58,311	
Lambs bought in to fatten	5,820	
Total lambs	64,131	
		Per cent.
Lambs sold fat off mothers	18,003	28
Lambs fattened on feed	18,386	29
Other lambs sold	4,965	8
Lambs retained	20,810	32
Deaths in lambs	1,967	3
	64,131	100
Average lambing percentage	103 per cent.	
Average weight of dressed lamb	35.7lb.	
Average lamb meat sold per acre of plain	19lb.	

Of the total lambs tailed 31 per cent. were sent away fat off their mothers, which illustrates the success of fat lamb farming on the plain. Only 2 farms grew special crops for fattening lambs and most of the lambs were weaned on to and fattened on lucerne and grass. The production of fat lambs reached a high standard, less than 8 per cent. of the total lambs being sold in store condition.

On a few farms shearing is done before lambing, but the main periods for shearing are in November for dry sheep and December for ewes. After weaning lambs in February, the owners with tussock runs shift all the

HEADING PHOTOGRAPH: In the Maniatoto Basin farming is concentrated mainly on the production of fine wool and fat lambs.

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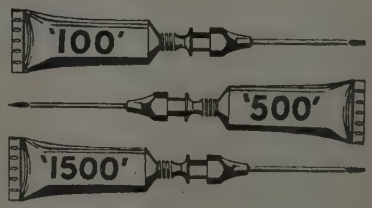

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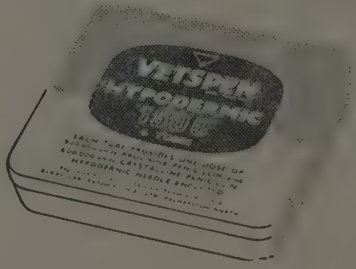

sound ewes on to the hills to spell the plain during autumn. The ewes return to the plain in April for tupping, but the hoggets may remain until the onset of winter, when they are brought down for supplementary feeding with lucerne hay and turnips.

The general practice is to keep the ewes until they are 4 or 5 years old before they are sold, when they are eagerly sought by fat lamb producers from Canterbury to Southland.

The only area where cattle assume any importance is on land bordering the Taieri River, where low-lying areas provide excellent cattle grazing during summer.

Production

The proceeds from the sale of wool and fat lambs contribute at least three-quarters of the gross income on any farm in the survey. Table 7 gives some indication not only of total production for these farms, but the average production per unit of livestock and per acre of both lamb meat and wool. The per-acre production is calculated on the plains acreage only.

Lambs do particularly well in this district, as the average weight of lamb indicates, but lamb meat production per acre is not high compared with that in other districts with similar conditions. The range of production on individual farms is from 10.8lb. to 37.4lb. per acre and there is a close relation with the part played by lucerne on these farms.

TABLE 7—PRODUCTION OF FAT LAMB MEAT AND WOOL

Number of farms	53
Total fat lamb meat sold ..	1,298,575lb. (11,594½cwt.)
Average weight per dressed lamb	35.7lb.
Average weight per acre of plain	19lb.
Total wool produced	977,358lb. (2,792 bales)
Average weight of wool for each sheep shorn ..	10.3lb.
Average wool per acre of plain	14lb.

Wool production is good, with a high average fleece weight and good quality. The wool per sheep on individual farms ranges from 7lb. to 12.8lb. Maniatoto fine wools are always in demand at Dunedin sales.

Labour

In the assessment of labour, farmers' sons 16 years and older who are assisting on the farms have been classified as permanent hired labour. On the 53 farms in the survey a total labour force of 60 men is employed, with most of the larger holdings employing two and sometimes three men. There were 13 sole farmer enterprises and three other farms on which only casual labour (apart from shearing) is hired.

The availability of accommodation is not a real limiting factor to increased production, as it is mainly family labour that is employed. Greater intensification of farming would undoubtedly aggravate the labour position, but under the present system of farming, labour or the shortage of labour is not a pressing problem.

Economic Aspects

In this survey information on farm capital, income, and expenditure is presented from details obtained from most of the owners. In Table 8 the valuations of land and improvements are based on 1953 Government figures. Plant and machinery are valued according to their estimated resale value and livestock is included at conservative market rates ruling in 1952-53.

As farms increase in size the capital values per acre tend to fall.

TABLE 8—FARM CAPITAL: AVERAGE VALUES PER ACRE AND PER FARM FOR LAND ON THE PLAINS

	£ per acre	Per cent.	Average per farm £
Unimproved value of land	4.9		6,415
Value of improvements	6.0		7,848
Value of land and improvements ..	10.9	65	14,263
Livestock	4.1	24	5,385
Plant and machinery	1.8	11	2,428
Total farm capital	16.8	100	22,076

Below—The only areas in the Maniatoto Basin in which cattle assume any importance are on land bordering the Taieri River, where low-lying country provides good grazing for them.

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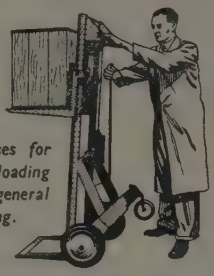

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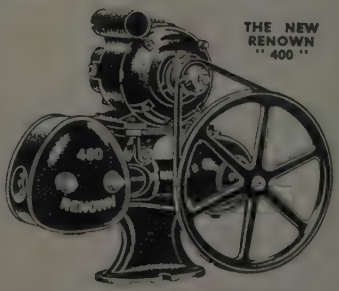

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The survey showed that of the total number of lambs tailed 31 per cent. were sold fat off the mothers. This illustration shows fat lambs being brought to the Waipiata station for railing to a freezing works.

When hill country is included the average values drop considerably to £1 12s. per acre for unimproved land and £2 per acre for improvements, giving a capital value of £3 12s. per acre over the whole properties. The amount of capital invested per livestock unit is not high when compared with other fat lamb producing districts, the average being £11 4s. per ewe equivalent for the whole survey.

Farm Income

Table 9 shows the high average farm income, of which 95 per cent. is contributed by sheep products. The various items of farm income show that wool is the most important item, followed by fat lambs. The greater part of the proceeds from other sheep is from the sale of cast for age ewes, for which there is always a keen demand.

The gross income per acre (£5 12s.) is not high compared with that of other fat-lamb districts and the range for individual farms is from £3 2s. to £7 18s. per acre. Gross income per ewe equivalent is also high.

TABLE 9—GROSS FARM INCOME

Number of farms	47
Average gross income per farm	£7,427
Gross income per acre of plain	112s.
Gross income per ewe equivalent	82s.
	Per cent.
Income from:	
Wool	56
Fat lambs	25
Store lambs	3
Other sheep	11
Cattle	4
Miscellaneous	1
	100

Farm Expenditure

Expenditure includes all the operating expenses of the farm and allowances for depreciation and interest, both these being at 5 per cent. on the value of all livestock, plant, and machinery. The main items are wages and contract work and sheep purchases. The other items are reasonably low in comparison with the expenses in other sheep districts, and this also applies to the average farm expenditure per acre and per ewe equivalent.

TABLE 10—FARM EXPENDITURE

Number of farms	47
Average expenditure per farm	£3,618
Average expenditure per acre of plain	56s.
Average expenditure per ewe equivalent	40s.
	Per cent.
Farm expenditure on:	
Wages and contract	21
Repairs and maintenance	7
Tractor, truck, and car, etc.	9
Seeds and manure	10
Freight	3
Sheep purchases:	
Replacements	12
Store sheep	6
Cattle	7
Sundry	7
Depreciation	8
Interest on the value of livestock and plant and machinery	10
	100

Owner Surplus

Owner surplus is the amount remaining from gross farm income after meeting all farm expenses, depreciation on all assets, and interest on the value of livestock, plant and machinery, and land and buildings. In other words it represents the reward to the farmer for managing and working on the farm.

The southern Maniatoto Plain is excellent for the production of fine wool and fat lambs, and with the low expenditures incurred the owner surplus is high for this type of farming, as is shown in Table 11. A high standard of living with many new homes with modern conveniences is afforded by present high returns.

TABLE 11—AVERAGE OWNER SURPLUS

	Per farm	Per acre
	£	s.
Gross farm income	7,427	112
Farm expenditure	3,618	56
Farm income	3,809	56
Less interest on capital value of farm	636	8
Owner surplus	3,173	48
Owner surplus per ewe equivalent		36

To produce £1 of owner surplus on these farms requires an expenditure of £2 13s. On the smaller farms the earning of £1 surplus requires £2 3s. in farm expenditure and on the larger farms it needs £3 1s. The distribution of owner surplus is shown in Table 12.

TABLE 12—DISTRIBUTION OF OWNER SURPLUS

Owner surplus	Number of farms	Per cent. of farms
£		
Under 1,000	7	15
1,000 and under 2,500	13	28
2,500 and under 5,000	14	30
5,000 and under 7,500	10	21
7,500 and over	3	6
	47	100

The average owner surplus for the 47 farms was £3589, but 28 owners or 60 per cent. make less than this figure.

Lucerne

A great part of the soils of the southern Maniatoto Plain is suitable for the establishment of good lucerne stands. The benefit to be gained from using lucerne is clearly seen in Table 13, which compares the results on two groups of farms, one group with a large acreage in lucerne and the other group having a negligible amount of lucerne. All these farms are on the plain and the main difference between the two groups is the acreage in lucerne. The striking differences in production show that on farms making intelligent use of lucerne stock-carrying capacity is double, wool production per acre is over twice as great, lamb-meat production is almost treble, and owner surplus per acre is 4½ times that of farms with little lucerne.

Another group of 6 farms with an average area of 1140 acres and with approximately 10 per cent. of their farm areas in lucerne had an average owner surplus per acre of 31s. and the average weight of wool and lamb meat per acre was intermediate between Groups A and B in Table 13.

TABLE 13—RESULTS ON TWO GROUPS OF FARMS ON THE PLAINS: GROUP A WITH LARGE ACREAGE IN LUCERNE AND GROUP B WITH SMALL ACREAGE

	Group A	Group B
Number of farms ..	6	6
Average area (acres) ..	1,130	1,537
Lucerne:		
Average area (acres)	265	36
Per cent. of total farm [illegible]	23	2
Stock carrying capacity (ewe equivalents per [illegible]	1.6	0 8
Wool production:		
Lb. per acre	15.2	6.9
Lb. per sheep shorn ..	10.7	9 3
Lamb meat production:		
Lb. per acre	28.6	10 8
Average lamb weight .	37.4	33 8
Owner surplus per acre (s.)	72	16

A salient feature of the Maniatoto survey was the part lucerne could play in increasing stock carrying capacity in the area. In a study of two similar-sized groups of six farms the group which had an average of 23 per cent. of farm areas in lucerne had a carrying capacity of 1.6 ewes per acre against .8 ewes per acre for the group of farms which had an average of 2 per cent. of farm areas in lucerne. 1—Lucerne stand (right) and poor pasture (left). 2—Lucerne stand at Gimmerburn. 3—Sheep grazing on lucerne at Gimmerburn. 4—Baled lucerne hay. The lucerne has made a good recovery after a summer cut.

Table 14 gives a comparison of two groups of six farms, one group recording a high owner surplus per acre and the other group a low surplus. The great differences in the total farm receipts and in the owner surplus per acre reflect the differences in productive capacity of the farms. High returns and high production are achieved by the use of large acreages of lucerne and by having part of the farm under partial irrigation. The expenditure of operating the farms is higher, but the surplus is 4½ times greater than the group with low owner surplus.

Farms earning a low owner surplus produce less from their old pastures and native swards; only 2 per cent. of the farm area is in lucerne and only 3 per cent. under partial irrigation.

TABLE 14—COMPARISON OF TWO GROUPS OF FARMS ON THE PLAIN, ONE GROUP WITH HIGH OWNER SURPLUS PER ACRE AND THE OTHER GROUP WITH LOW OWNER SURPLUS

	Group A	Group B
Number of farms	6	6
Average owner surplus per acre	72s.	16s.
Average farm receipts per acre	158s.	62s.
Per cent. of farm in lucerne	22	2
Per cent. of farm partially irrigated	14	3

Another group of six farms with an average owner surplus of 55s. per acre and average farm receipts of 126s. per acre had an average of 13 per cent. of their farm areas in lucerne and 12 per cent. under partial irrigation.

The important place that lucerne occupies on the farms with high returns is a guide to the future development of the whole plain. The six farms with the low owner surpluses have the lowest percentage of lucerne acreage on the Maniatoto Plain. The greater area under partial irrigation on the group of high earning farms assists them in achieving their high production.

Potential Production

An estimate of the potential farm production of the southern Maniatoto

SOUTHERN MANIATOTO SURVEY . . .

TABLE 15—PRESENT AND POTENTIAL PRODUCTION OF FARMS WHOLLY ON THE SOUTHERN MANIATOTO PLAIN

	Present production	Potential production	Increase	Percentage increase
Total area (acres) ..	30,868	30,868		
Carrying capacity (ewe equivalents per acre)	1.1	1.8	0.7	64
Lamb meat per acre (lb.)	21.0	35.0	14.0	67
Wool per acre (lb.) ..	11.3	17.2	5.9	49

Plain can be based on the present production of the farms earning the highest owner surpluses. The top farms are not at peak production by any means, so the increases shown are conservative figures which should be readily obtained in the future.

In Table 15 the figures for present and potential production on farms that are situated wholly on the plain illustrate the marked improvement that can be achieved, allowing for an increased acreage in lucerne and for better supplies of water for stock.

In physical terms this estimate represents an increase of 21,500 ewe equivalents in the stock that could be carried or an increase of 3850cwt. of lamb meat and 500 bales of wool.

In the consideration of properties having hill blocks and plain worked in conjunction it is assumed that the plains area has a potential equal to that shown for farms in Table 16.

The present stock carrying capacity of the hill country is calculated at 0.4 ewe equivalents per acre. Because of the hill blocks attached to these farms the average stock carrying capacity based on the acreage of plain in each farm is 1.5 ewe equivalents per acre of plain. It is estimated that with the destruction of the rabbits on the hills and an increased acreage of lucerne on the plain the stock carrying capacity could be raised to approximately 2.5 ewe equivalents per acre of plain. Table 16 shows the estimates for the farms which have land on both the plain and the hills.

For all farms included in the survey the potential increase in stock carrying capacity is estimated to be nearly 60,000 ewe equivalents or 65 per cent. increase, for lamb meat production 14,300cwt. or 128 per cent., and for wool production 1700 bales or 68 per cent.

The increase in lamb meat would come partly from an increase in numbers of breeding ewes and partly from higher lambing percentages under improved management. Similarly with wool production the increases would be partly from greater sheep numbers and partly from higher average fleece weights.

TABLE 16—PRESENT AND POTENTIAL PRODUCTION OF PROPERTIES HAVING PLAIN AND HILL BLOCKS WORKED IN CONJUNCTION

	Present production	Potential production	Increase	Percentage increase
Total area:				
Plains	37,663	37,663		
Hills	141,867	141,867		
Carrying capacity (ewe equivalents per acre of plain)	1.5	2.5	1.0	67
Lamb meat per acre (lb.)	16.0	47.0	31.0	194
Wool per acre (lb.) ..	13.8	25.2	11.4	83

Present Position and Prospects

The system of farming common on the southern Maniatoto Plain is the semi-intensive grazing of fine-woolled sheep for the production of wool and fat lambs. This system is admirably suited to the healthy environment and on the larger holdings produces high returns and provides a high standard of living for the owners.

The key to increased production lies in the extension of good farm management (particularly an increase in the acreage in lucerne), better reticulation of water for stock, subdivision of the present large fields, and better provision for feeding during winter and lambing.

The estimate of potential production of this area under improved dryland farming management is based on the present achievements of the best farmers, who are steadily improving their properties beyond the potential over-all standard. To achieve the potential estimated is not impossible for this favourable farming area.

☆

Radio Broadcasts to Farmers

RADIO broadcasts to farmers will be given during September as follows:—

1XH Hamilton

12 September (12.33 p.m.)—"The Control of Mastitis", by O. V. Griffiths, Veterinarian, Department of Agriculture, Hamilton.

19 September (12.33 p.m.)—"A Few Observations in Planning a Utility Garden", by W. Brandenburg, Horticultural Instructor, Department of Agriculture, Hamilton.

26 September (12.33 p.m.)—"Has the Farmer a Voice?", by M. Boyce, Federated Farmers, Hamilton.

30 September (8.10 p.m.)—"Current Farming Problems", by a panel of speakers.

1YZ Rotorua, 7.15 p.m.

1 September—"Cropping for Summer Production", by B. A. Gunning, Instructor in Agriculture, Department of Agriculture, Matamata.

15 September—Talk on beekeeping topics, by Apiary Instructor, Department of Agriculture, Tauranga.

28 September—"Curd Preservation", by H. H. Preston, Supervisor, Bay of Plenty District Pig Council.

29 September—"Tuberculin Testing", by D. W. Caldwell, Veterinarian, Department of Agriculture, Hamilton.

2XA Wanganui, 8 p.m.

1 September—"For the Country Woman", by Mary MacDonald.

8 September—"The Radio Vet.", by S. Jamieson, Veterinarian, Department of Agriculture, Wanganui.

15 September—"The Growing of Food for Pigs", by C. M. Baillie, Supervisor, Taranaki District Pig Council.

22 September—"The Importance of the Wool Clip and Some Reflections on its Marketing", discussion between Wanganui Wool Brokers' Association and Department of Agriculture.

29 September—"The Swede Crop", by A. A. Duncan, Instructor in Agriculture, Department of Agriculture, Wanganui.

2ZA Palmerston North, 12.33 p.m.

5 September—"Some Thoughts on Exotic Diseases", by P. T. Allison, Veterinarian, Department of Agriculture, Palmerston North.

12 September—"Building Silage Clamps and Buns", by J. O. Brasell, Farm Machinery Instructor, Department of Agriculture, Palmerston North.

26 September—"Y.F.C. Session", by I. G. Tabor.

3YA Christchurch

12 September (12.20 p.m.)—"The Young Farmer and His Place in Agricultural Advancement", by A. J. Blair, chairman, Mid-Canterbury district committee of the New Zealand Federation of Young Farmers' Clubs.

4YA Dunedin, 9.15 p.m.

5 September—"Pests and Diseases in the Home Garden", by A. G. Kennelly, Horticultural Instructor, Department of Agriculture, Dunedin.

12 September—"Spring and the Beekeeper", by L. J. S. Line, Apiary Instructor, Department of Agriculture, Invercargill.

19 September—"Farming in North Otago", by W. R. Lobb, Instructor in Agriculture, Department of Agriculture, Oamaru (discussion with Horticultural and Poultry Instructors).

26 September—"Farming in North Otago", discussion between W. R. Lobb, Instructor in Agriculture, and a farmer.

Regular Sessions

1XH Hamilton, Mondays at 12.33 p.m. and Tuesdays at 8 p.m. (Frankton stock market report), Wednesdays at 12.33 p.m. (report from Ruakura Animal Research Station), Thursdays at 12.33 p.m., Fridays at 8 p.m. (stock sale review).

1XN Whangarei, Mondays at 8.5 p.m., Wednesdays at 8.1 p.m. (Northland stock market report), Fridays at 8.1 p.m.

1YA Auckland, Mondays, Tuesdays, Wednesdays, Thursdays, Fridays, 7.45 p.m., and Saturdays at 6 p.m.

1YZ Rotorua, Mondays at 12.33 p.m. (Waikato stock market review), Tuesdays at 7 p.m. (Hamilton stock market report), Wednesdays at 7.15 p.m. (Pig Council talk on fourth Wednesday of every other month), Thursdays at 12.33 p.m. and 7.15 p.m. (fortnightly).

2XA Wanganui, Wednesdays at 8 p.m. (Wanganui stock sale report), Thursdays at 8 p.m.

2XG Gisborne, Tuesdays at 8 p.m., Fridays at 8.2 p.m. (Gisborne stock market report).

2XN Nelson, Thursdays at 8 p.m.

2XP New Plymouth, Thursdays at 8.1 p.m.

2YA Wellington, Mondays at 7.15 p.m., Thursdays at 12.33 p.m., Fridays at 7 p.m.

2YZ Napier, Tuesdays at 12.12 p.m. (Hawkes Bay orchardist session), Tuesdays at 7.10 p.m., Wednesdays at 7.15 p.m. (Hawkes Bay-Poverty Bay livestock market report), Thursdays at 12.33 p.m.

2ZA Palmerston North, Mondays at 12.33 p.m., Fridays at 8.45 p.m. (Feilding stock market report).

3XC Timaru, Mondays at 8 p.m. (Pleasant Point stock market report), Tuesdays (fortnightly) at 8 p.m. (Temuka stock market report), Wednesdays at 8 p.m., and Saturdays at 10.30 a.m.

3YA Christchurch, Mondays at 12.20 p.m., Wednesdays at 7.15 p.m. (Addington stock market report), Thursdays at 12.33 p.m. and 7.15 p.m.

3YZ Greymouth, Thursdays at 12.33 p.m.

4YA Dunedin, Mondays at 12.33 p.m., Wednesdays at 7 p.m. (Burnside stock market report), Thursdays at 12.33 p.m.

4YZ Invercargill, Mondays at 12.33 p.m., Tuesdays at 7 p.m.

Pollinators for Pip and Stone Fruit Varieties

National Publicity

DISAPPOINTING crops of some varieties of fruit trees grown in commercial orchards or home gardens may sometimes be avoided by a knowledge of their requirements for cross-pollination. In a commercial orchard large numbers of trees of one variety known to be self-sterile should be interplanted with other varieties which will pollinate them effectively. In a home garden where only one or two trees of a kind are grown the choice of varieties is even more important, as it does not often happen that effective pollinators are already present in the neighbourhood. In this article varieties of pip and stone fruits are classified according to their pollinator requirements, and orchardists and home gardeners alike are recommended to study the lists before ordering fruit trees for planting, so that disappointing results can be avoided. The section on apples and pears has been prepared by C. E. Woodhead, Pip Fruit Specialist, Department of Agriculture, Palmerston North, and that on stone fruits by A. T. J. Watts, Stone Fruit Specialist, Department of Agriculture, Christchurch.

PIP FRUITS

Apples

THE purpose of this section is to bring together what is known of the pollination requirements of New Zealand apple varieties, for the information of both the commercial fruit grower and the home gardener.

Few apple varieties in other countries have proved self-fruitful to the extent of setting a good crop when pollinated with their own pollen, and much attention has, therefore, been given to selection of pollinating varieties. In New Zealand, on the other hand, the need for making special provision for cross-pollination of apples has been less obvious.

In many commercial orchards comparatively large blocks of a single variety are producing satisfactory crops, and in home gardens, where often only one or two apple trees are planted, cross-pollination is seldom given a thought, yet trees rarely fail to crop for this reason. Though in New Zealand there has been little or no scientific investigation in this field, it would appear that most apple varieties are more self-fruitful than they are in some other countries.

Nevertheless the very considerable evidence from overseas experiments clearly shows that in the countries concerned cross-pollination is necessary for most apple varieties, and literature on this subject frequently contains a recommendation that in the planting of commercial orchards trees of one variety should not be more than two rows distant from a pollinating variety. Though this degree of interplanting of apples may not be generally necessary under New Zealand conditions, it is probable that a more adequate provision of pollinators would improve the yield of certain varieties, especially in years when unfavourable weather prevails during the blossom period.

In an experiment carried out by the author some years ago flowers of the Delicious apple pollinated with Delicious pollen failed to set a single fruit, though a set was obtained when the pollen of other varieties was used.

Overseas Experience

The non-setting of Delicious with its own pollen has also been reported in other countries. On the other hand, experiments overseas have shown Delicious to be an excellent pollinator for other varieties.

A variety to be a good pollinator must produce pollen of high germination capacity. In this connection apple varieties fall into two groups, the diploids and the triploids. Diploid varieties, so called because they possess two sets of chromosomes, the carriers of hereditary material, have good pollen; the triploids, with three sets of chromosomes, have pollen of poor germination capacity and are, therefore, unsatisfactory pollinators.

Fortunately, from the aspect of pollination diploids, are more numerous than triploids in New Zealand cultivated varieties. Instances occur, however, where a diploid variety is not effective as a pollinator for one particular variety, though successful with others. It is then said to be incompatible with that variety. Cross-incompatibility is fortunately rare in apples.

Flowering Period a Factor

The flowering periods of the pollinator and the variety requiring pollina-

TABLE I—POLLINATORS FOR NEW ZEALAND APPLE VARIETIES

	Flowering season		
	Early	**Mid-season**	**Late**
Group 1: Varieties with good pollen	Beauty of Bath, Duchess of Oldenburg, Irish Peach, Red Astrachan	Ballarat, Cleopatra, Cox's Orange Pippin, Delicious, Dunn's Favourite, Ecklinville Seedling, Emperor Alexander, Jonathan, McIntosh Red, Northern Spy, Rokewood, Sturmer	Frimley Beauty, Lord Wolseley, Rome Beauty, Worcester Pearmain
Group 2: Varieties with poor pollen	Albany Beauty, Gravenstein, Oratia Beauty	Alfriston, Reinette du Canada, Stayman Winesap, Warner's King	
Group 3: Unclassified varieties	Cox's Early Export, Kentish Fillbasket, Willie Sharp	Brighton, Dougherty, Giant Jeniton, Golden Delicious, Granny Smith, Kidd's Orange Red, Legana, Mobb's Royal, Statesman, Tasma, Yates	

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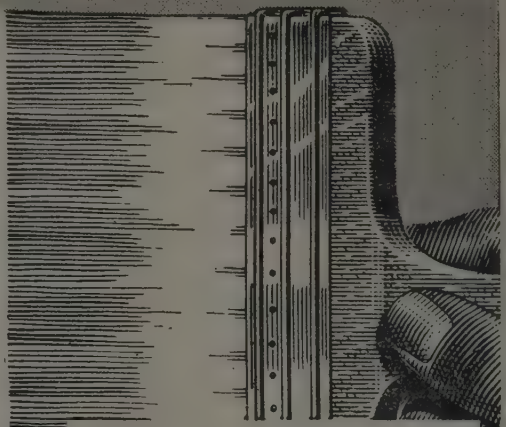

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tion have also to be considered. In Table 1 the classification of varieties according to flowering season is based on records taken throughout the Dominion over a 4-year period by instructors of the Horticulture Division of the Department of Agriculture.

Apple varieties flower over a long period in most districts and, depending on season and district, an interval of 2 to 4 weeks may separate full bloom of the earliest and latest varieties.

A late flowering variety should not, therefore, be selected to pollinate an early variety or vice versa. To provide fully for cross-pollination it is necessary to plant together varieties of the same flowering season. This may not always be possible; for example, when only a few varieties with different flowering periods are being grown.

In these circumstances early and mid-season or mid-season and late flowering varieties should be planted together, as their blossom periods usually overlap sufficiently to ensure a considerable degree of cross-pollination.

An exception is Rome Beauty and its sport, Frimley Beauty, which bloom too late in most districts to be pollinated by mid-season varieties. This may not prove a serious handicap, however, as Rome Beauty is reported as being considerably self-fruitful in North America and South Africa.

In the classification of varieties in Table 1 as having good or poor pollen use has been made of information from overseas sources indicating their status as diploids or triploids, the germination capacity of their pollen, or their behaviour as pollinators in tests. Varieties are listed as unclassified where such information is not available.

As mentioned earlier, provided varieties of similar or overlapping blossom periods are selected, any variety in Group 1 may be chosen to pollinate any other variety of this group or of Groups 2 and 3. For the varieties of Group 2—the known producers of bad pollen—two pollinators will, however, be necessary to allow for cross-pollination of the pollinating variety.

As varieties with good pollen considerably outnumber the poor pollen varieties, there is little doubt that Group 3 contains some good pollinators, but in the absence of experimental evidence they must for the present remain unknown.

Pears

Adequate provision for cross-pollination is essential if disappointment in the cropping of pear trees is to be avoided. In many countries practical experience and scientific investigation alike have shown that many varieties of pears will bear little or no fruit unless pollinated by another variety. Certain varieties, on the other hand, have the ability to produce good crops when pollinated with their own pollen. Experience has shown, however, that self-fruitfulness in a variety is not a reliable character and, further, that the fruit resulting from self-pollination is usually smaller and of abnormal shape. To ensure satisfactory crops it is, therefore, a wise precaution to provide for cross-pollination of all pear varieties.

If pear trees are to be planted in the home orchard, at least two varieties will be required, each of which should be capable of pollinating the other successfully. To do this it is obviously necessary that their blossom periods should coincide or overlap considerably.

TABLE 2—POLLINATORS FOR PEAR VARIETIES

Variety	Effective pollinators	Suggested pollinators
Beurre Bosc	Clapp's Favourite, Williams Bon Chretien, Winter Nelis	
Beurre Capiaumont		Beurre Bosc, Williams Bon Chretien, Winter Nelis
Beurre Clairgeau	Beurre d'Anjou, Duchesse d'Angouleme, Fertility	
Beurre d'Amanlis	Louise Bonne de Jersey	
Beurre d'Anjou	Conference, Duchesse d'Angouleme	
Beurre Diel	Conference, Williams Bon Chretien	
Beurre Easter	Williams Bon Chretien	
Beurre Hardy	Beurre Easter	
Clapp's Favourite	Beurre Bosc, Conference, Williams Bon Chretien, Winter Nelis	
Conference	Beurre Bosc, Louise Bonne de Jersey, Williams Bon Chretien	
Doyenne du Comice	Beurre Bosc, Beurre Hardy, Williams Bon Chretien, Winter Nelis	
Duchesse d'Angouleme		Beurre d'Anjou, Josephine de Malines, P. Barry
Fertility	Conference	
Glou Morceau	Beurre Bosc, Beurre Easter, Williams Bon Chretien, Winter Nelis	
Jargonelle		Beurre d'Anjou, Duchesse d'Angouleme, Josephine de Malines
Josephine de Malines	Beurre Bosc, Beurre Hardy, Packham's Triumph, Williams Bon Chretien, Winter Nelis	
Kieffer's Hybrid		Brockworth Park, P. Barry
Louise Bonne de Jersey	Beurre d'Anjou, Conference, Jargonelle	
Marie Louise	Conference, Williams Bon Chretien	
Packham's Triumph	Williams Bon Chretien	
P. Barry		Beurre d'Anjou, Duchesse d'Angouleme, Kieffer's Hybrid
Twyford Monarch		Beurre Bosc, Josephine de Malines, Williams Bon Chretien, Winter Nelis
Vicar of Winkfield		Beurre Bosc, Josephine de Malines, Williams Bon Chretien, Winter Nelis
Williams Bon Chretien	Beurre Bosc, Clapp's Favourite, Conference, Marie Louise, Winter Nelis	
Winter Bartlett		Beurre Bosc, Josephine de Malines, Winter Nelis
Winter Cole		Beurre Bosc, Williams Bon Chretien, Winter Nelis
Winter Nelis	Beurre Bosc, Beurre Easter, Conference, Williams Bon Chretien	

In commercial fruit growing the earlier pear orchards established in New Zealand were usually interplanted with a large number of varieties and satisfactory cross-pollination was assured. With the trend in recent years toward the planting of fewer varieties there is a greater need to consider the pollination requirements of varieties.

In Table 2 information is given on varieties that have proved effective pollinators in tests carried out by research workers in other countries. For a number of varieties grown in New Zealand information based on experiments is lacking or the pollinators referred to are unsuitable because of a different period of flowering in New Zealand. For these varieties pollinators that should prove satisfactory have been suggested.

All pollinators included in the table correspond or overlap in blossom period with the variety requiring pollination.

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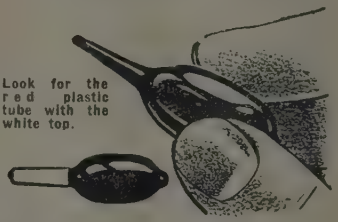

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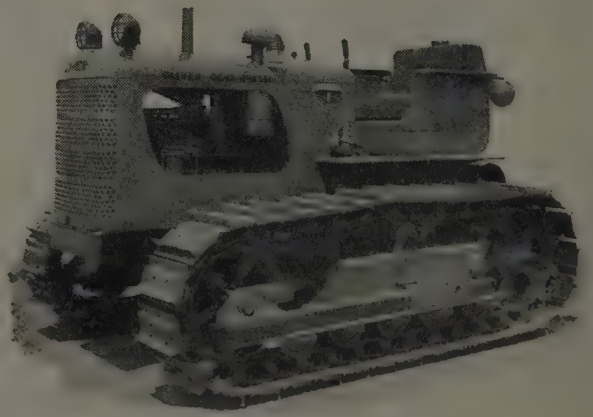

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STONE FRUITS

It is well known that many kinds of fruit will set better crops when they are cross-pollinated; this applies to most of the stone fruits, and for cherries and many plums cross-pollination is essential.

In Tables 3, 4, and 5 suitable pollinators are suggested for many of the varieties grown commercially in New Zealand.

A number of factors restrict the value of these lists. Soil, climate, rootstocks, and cultural methods all affect the time of flowering, and hence the overlap of any two varieties. There are differences in overlap between districts, and even within one district there will be variations from season to season. Some varieties are wrongly named, and in other instances there are several distinct strains or seedlings of a variety which may vary in their flowering periods and compatibilities. The lists should therefore be regarded as suggestions only.

There are two requisites for an efficient pollinator. Its flowering period should overlap sufficiently that of the variety being pollinated, and the two varieties should be compatible; that is, the pollen of one must be capable of fertilising the ovules of the other. Usually compatibility is reciprocal; that is, if variety A will fertilise variety B, variety B will also fertilise variety A, but there are exceptions in the European plums.

In some fruit growing areas wild bees and other types of insects, including flies, are regarded as efficient and important pollinating agents, but observations have shown that under New Zealand conditions practically all pollination of fruit blossom is done by hive bees.

Most pollination takes place in the few days immediately before full bloom. Though fertilisation is possible before and after this period, the greater the show of blossom is the stronger is the attraction to bees. Other factors which strongly influence bee visits are the amount and sugar concentration of the nectar and the type and abundance of pollen available. To ensure cross-pollination both the main variety and the pollinator should be attractive to bees.

Another point to be considered is the need to reduce to a minimum alternative sources of pollen or nectar, such as flowers of cover crops, weeds, and trees; bees may neglect fruit blossom for such plants as mustard, wild turnip, gorse, manuka, wattle, and kowhai, which often provide more suitable or more abundant pollen or nectar.

This is particularly important with stone fruit trees, which blossom relatively early in spring, when the population of most hives is at a low ebb and counter-attractions are likely to have a much more serious effect.

Bees at Blossom Time

To ensure successful pollination ample bees must be available at blossom time to transfer the pollen from one variety to another. Recent work suggests that individual bees, whether gathering nectar or pollen, normally work only in a restricted area at any one time, in an orchard probably on only one tree.

For efficient cross-pollination bees should be so numerous that competition forces them from one tree to the next.

In addition every tree requiring cross-pollination should be adjacent to one of the pollinating variety. Where varieties are of equal value planting them in alternate rows is probably the best arrangement. If one variety is used mainly or solely as a pollinator, it should be planted at least in every third space in every third row; that is, the centre tree of every block of nine should be a pollinator, and no tree of the main variety should be more than one space, either in a row or diagonally, from the pollinator.

In some cases where a pollinator is needed but it is not practicable to plant a tree of a suitable variety alongside the trees to be pollinated, the difficulty may be overcome by grafting or budding the pollinator on to one or more branches of the main variety. A temporary expedient is to place flowering branches of the pollinating variety in tins or jars of water suspended in the tree. Better results are obtained when the pollinator being introduced, either as a bouquet or as a permanent part of the tree, is placed fairly high up, where it is more likely to be visited by bees.

The value of bees to the orchardist in the form of increased fruit set is normally far greater than the value of the honey derived directly from fruit blossom. Every consideration should therefore be given to them, and, in particular, poisonous sprays should not be used during the period when the bees are working the blossom.

Pollination Needs of Stone Fruits

Pollination requirements of the various kinds of stone fruit are discussed here.

TABLE 3—CHERRY VARIETIES AND POLLINATORS

No.	Variety	Group	Suggested pollinators
1.	Bedford Prolific	I	4, 7, 8, 10, 12, 17, 18, 20, 21, 23, 24, 25, 28
2.	Belle Ellen		7, 25
3.	†Bigarreau de Mezel 1 and 2	III	
	Bigarreau de Mezel 3	VII	17, 18, 19, 20
4.	Bigarreau Napoleon	III	1, 9, 11, 14, 15, 17, 18, 19, 20, 21, 22, 23, 24, 28, 29
5.	Bigarreau Pelissier		7, 17, 20, 23, 24, 28
6.	Bigarreau Twyford		10
7.	Bing	(?III)	1, 2, 5, 10, 11, 18, 22, 23, 25, 27, 28
8.	Black Boy		1, 10, 24, 28
9.	Black Eagle		4
10.	*Black (St.) Margaret		1, 6, 7, 8, 20, 23
11.	†Black Tartarian A and B	I	4, 7, 15, 18, 24, 25
	Black Tartarian D	X	
	Black Tartarian E	=	
12.	Bohemian Black	V	1, 17, 19, 20, 25
13.	Burgsdorf Seedling		15, 17, 18, 19
14.	Centennial		4
15.	Chapman		4, 11, 13, 17, 18, 19, 28
16.	Doncaster Prolific		19
17.	Early Lyons (Syn.: Big Jaboulay and Ramon Oliva (?))	X	1, 3, 4, 5, 12, 13, 15, 18, 19, 20, 21, 22, 25, 28, 29
18.	Early Purple Guigne	=	1, 3, 4, 7, 11, 13, 15, 17, 19, 29
19.	Early Rivers	I	3, 4, 12, 13, 15, 16, 17, 18, 20, 21, 23, 25, 28, 30
20.	Florence	=	1, 3, 4, 5, 10, 12, 17, 19, 21, 24, 25, 26, 27, 28, 29
21.	Governor Wood	VI	1, 4, 17, 19, 20
22.	Knight's Early Black	I	4, 7, 17
23.	Late Black Bigarreau	V	1, 4, 5, 7, 10, 19, 28
24.	*Noble	XII	1, 4, 5, 8, 11, 20, 25, 27
25.	Noir de Guben	=	1, 2, 7, 11, 12, 17, 19, 20, 24, 27
26.	Oregon		20
27.	Paul		7, 20, 24, 25
28.	*St. Margaret		1, 4, 5, 7, 8, 15, 17, 19, 20, 23, 29
29.	Werder's Early Black		4, 17, 18, 20, 28
30.	White Heart		19

* There appear to be at least two strains of St. Margaret, one of which may be identical with the variety grown in England as Noble.

† In each of these varieties there are a number of strains which vary in their blossoming periods and compatibilities.

I, V, X, etc.—Group number given by M. B. Crane.

= (in group column)—Universal donor.

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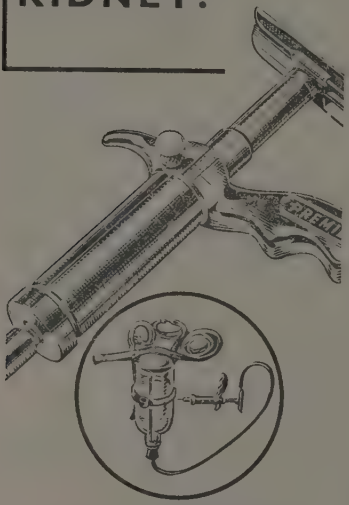

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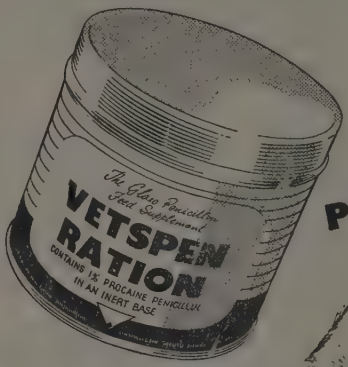

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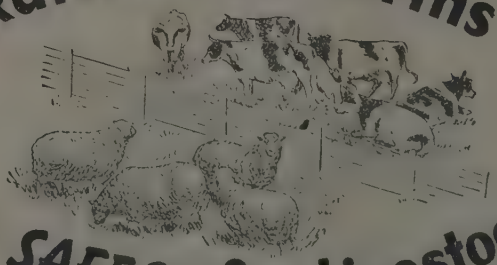

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POLLINATORS FOR STONE FRUIT VARIETIES

TABLE 4—EUROPEAN PLUM VARIETIES AND POLLINATORS

No.	Variety	Fertility	Suggested Pollinators
1.	Angelina Burdett	S.f.	5, 6, 8, 9, 10, 12, 20
2.	Brahay's Greengage	S.F.	
3.	Cambridge Gage	S.F.	4, 13, 19, 22
4.	Coe's Golden Drop	S.S.	3, 7, 10, 16, 17, 18, 19, 20, 22
5.	Damson	S.F.	1
6.	Diamond	S.S.	1, 8, 9, 10, 11, 12, 17, 18, 20
7.	Early Greengage	S.S.	4, 11, 18, 20, 22, 23
8.	Early Orleans	S.S.	1, 6, 11, 12, 20
9.	Grand Duke	S.S.	1, 6, 10, 11, 12, 17, 19, 20, 21
10.	*Greengage	S.S.	1, 4, 6, 9, 13, 16, 19, 24
11.	Jefferson	S.S.	6, 7, 8, 9, 17, 20, 21, 22, 23
12.	King Billy	S.S.	1, 6, 8, 9, 20
13.	Kirke's Blue	S.S.	3, 10, 15, 18, 19, 22, 23
14.	Magnum Bonum—Red	S.F.	
15.	Magnum Bonum—White	S.F.	13, 18, 19
16.	Magnum Bonum—Yellow	S.S.	4, 10, 19, 20
17.	Monarch	S.F.	4, 6, 9, 11
18.	*Old Greengage	S.S.	4, 7, 13, 15, 22, 23
19.	Pond's Seedling	S.f.	3, 4, 9, 10, 13, 15, 16, 23, 24
20.	President	S.f.	1, 3, 4, 6, 7, 9, 11, 12, 16, 18, 21, 22, 23
21.	Reine Claude de Bavay	S.F.	9, 11, 20
22.	River's Early Prolific	S.f.	3, 4, 7, 11, 13, 18, 20, 23
23.	Victoria	S.F.	7, 11, 13, 18, 19, 20, 22
24.	Washington Gage	S.S.	10, 19

S.F.—Self-fertile. S.f.—Partially self-fertile. S.S.—Self-sterile.

* Apart from named seedlings (for example, Cambridge Gage, Coe's Golden Drop, Early Greengage, Jefferson, Reine Claude de Bavay, Washington Gage, etc.), there are a number of strains or unnamed seedlings of the original Greengage which vary in their fertility and compatibilities; many authors do not differentiate between these.

TABLE 5—JAPANESE PLUM VARIETIES AND POLLINATORS

No.	Variety	Fertility	Suggested pollinators
1.	Alpha	S.S.	2, 4, 17, 19, 29, 31
2.	Billington	S.S.	1, 7, 12, 14, 19, 24, 27, 28, 29, 31
3.	Booth's Blood		12, 19
4.	Burbank	S.F.	1, 7, 8, 11, 16, 23, 24, 26
5.	Doris		7, 16, 17, 19, 23, 27
6.	Duff's Early Jewel	S.F.	
7.	Early Sultan		2, 4, 5, 12, 17
8.	Elephant Heart (Masterpiece)	S.S.	4, 12, 23
9.	Epoch		12
10.	Ford's Early		17
11.	Formosa	S.f.	4, 16, 19, 26
12.	George Wilson (Omega)	S.F.	1, 3, 7, 8, 9, 14, 18, 23, 25
13.	Hermosillo		31
14.	Mariposa	S.S.	2, 12, 23
15.	Narrabeen		19, 22
16.	October Purple		4, 5, 11, 17, 26
17.	Purple King		1, 5, 10, 16, 21, 24, 30, 31
18.	Improved Purple King		12, 27
19.	Santa Rosa	S.F.	1, 2, 3, 5, 11, 15, 20, 22, 24
20.	Satsuma	S.F.	19
21.	Sharp's Early	S.F.	17, 31
22.	Shiro		15, 19, 26
23.	Sultan	S.f.	4, 5, 8, 12, 14
24.	Vaile's Early		2, 4, 17, 19
25	Victory		12
26.	Wickson	S.S.	4, 11, 16, 22
27.	Wilson's Early	S.F.	2, 5, 18
28.	Wright's Delicious	S.F.	2
29.	Wright's Early	S.F.	1, 2
	Other Species		
30.	Evan's Early (European)		
31.	South Australian Cherry Plum (Myrobalan)		

S.F.—Believed to be self-fertile. S.f.—Believed to be partially self-fertile. S.S.—Believed to be self-sterile.

Apricots

As far as is known all apricot varieties grown in New Zealand are self-fertile and cross-pollination is not necessary.

Peaches and Nectarines

Only one peach variety grown commercially in New Zealand is self-sterile. This is J. H. Hale (Million Dollar), which has defective pollen and should not be planted in large blocks. Any other variety which blossoms at the same time should be effective as a pollinator.

Cherries

All sweet cherries are self-sterile, and in addition there are at least 12 groups the varieties within which are inter-sterile; that is, a variety in, say, Group 1 (see Table 3) cannot be fertilised either with its own pollen or with the pollen of any other variety in that group. However, there are a number of varieties which apparently do not belong to any of these groups: The pollen of these is capable of fertilising any other variety which blossoms at the same time. These "universal donors" are indicated in the list by the symbol =. Most work on this aspect has been done by M. B. Crane, of the John Innes Horticultural Institute, and his classification has been used. Quite a number of varieties grown in New Zealand are of American or Australian origin and their grouping has not yet been determined.

The list of suggested pollinators has been compiled from English work, mainly that of M. B. Crane, based on controlled pollinations, other overseas recommendations, and field observations in New Zealand. Varieties not generally grown in New Zealand have been omitted, even though considerable information is available on their pollination requirements.

Plums

Both European and Japanese varieties can be classified into three groups.

1. Those which will set a commercial crop with their own pollen (self-fertile);
2. Those which will set some fruit, but less than a commercial crop, with their own pollen (partially self-fertile), and
3. Complete self-sterile varieties.

Suitable pollinators must be planted with Groups 2 and 3, and in many instances cross-pollination is beneficial for varieties in Group 1.

Practically every European plum is capable of pollinating any other European variety which blossoms at the same time; exceptions are:—

(a) Coe's Golden Drop and Jefferson are incompatible; and

(b) President pollinated by Cambridge Gage or Old Greengage will set a crop, but neither of the gages will set if pollinated by President.

Apart from the above instances, compatibility is apparently reciprocal.

Pollen of Japanese varieties does not seem to be capable of fertilising European varieties, but a few of the latter will apparently fertilise at least some Japanese or hybrid varieties.

The list of pollinators for European plums has been compiled from overseas sources, mainly English, supplemented by field observations in New Zealand. As with cherries, much investigational work has been carried out overseas, but much of the information available is not applicable locally because of the comparatively restricted range of varieties grown here.

With Japanese plums, on the other hand, a fair proportion of the varieties are of New Zealand or Australian origin, and little work has yet been done on compatibilities. The list is, therefore, based mainly on field observations by instructors of the Horticulture Division, supplemented by Australian and American records where they are applicable.

Personalities at Y.F.C. Federation's 21st Anniversary

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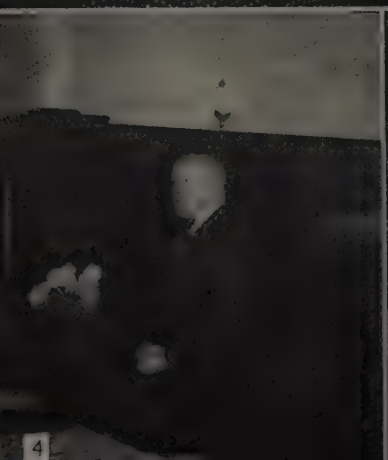
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Y.F.C. Federation Celebrates 21st Anniversary

THE achievements of the New Zealand Federation of Young Farmers' Clubs in its first 21 years and the responsibilities of its members as the future leaders of the farming industry were described by speakers at the federation's 21st annual general meeting and birthday celebration at Dunedin in June.

THE Minister of Agriculture, Mr. K. J. Holyoake, said that there was more for the good and progress of New Zealand in the Young Farmers' Clubs federation than in any other organisation he knew. The Minister described the 355 clubs and 10,000 members throughout New Zealand as a great rural university which gave no diplomas, but whose graduates were able to become responsible members of the primary industry.

Another point that Mr. Holyoake emphasised was that the responsibility for achieving the increase in production necessary to cater for the needs of the 1 million population increase expected over the next 20 to 25 years would fall largely on men who had come up through the Young Farmers' Clubs federation.

The 2-day programme consisted of business sessions during the day, and on the first evening there was a banquet attended by 960 persons to honour the founders. On the second evening a concert and ball were held. Dunedin was chosen as the venue for the celebrations, for it was there that the federation began in 1934.

The delegates were welcomed by the Mayor of Dunedin, Mr. L. M. Wright. The retiring Dominion president, Mr. G. W. Guy, East Tamaki, presided, and he was succeeded by the new Dominion president, Mr. G. J. Pullar, Pukerau.

In his address Mr. Holyoake said that the Government gave all possible assistance and encouragement to the Y.F.C. movement, because it wanted to see that the young man on the land had the opportunity of proper training and of becoming a leader in his industry.

Significant Work

The Department of Agriculture provided the full-time services of a number of officers for the federation and field officers of the Department engaged on extension work with farmers gave time willingly to guiding, encouragement, and education in Young Farmers' Clubs. The Government placed a good deal of significance on the progress of the organisation, because it realised how important a place it held in the farming community.

In the farming industry the scientific and the practical sides had to be combined and each was of great importance. The knowledge gained by scientists and research workers had to be made available to farmers, and the Young Farmers' Clubs were one of the most effective ways for this to be done.

Increasing Complexities

The processing, packaging, and marketing of New Zealand's primary produce had become much more of a business for the farmer, individually and collectively. The country would continue to depend for its subsistence and standard of life on the primary industry, whose produce was sold on the markets of the world to buy the manufactures and raw materials that could not be made or produced in New Zealand.

Valuable Training

The Minister commended the Y.F.C. organisation as a valuable training field in character and as a means of teaching its members to express themselves clearly and forcefully. In the 25 years he had been in farming organisations he had seen many older farmers who had been unable to express their very worthwhile thoughts.

The expected population increase of 1 million in the next 20 to 25 years was a tremendous challenge, said Mr. Holyoake.

"You will be the leaders of the farming community in that period, and the increase in production necessary to uphold the living standards of the people will have to be achieved by you," said the Minister.

Ninety-eight per cent. of New Zealand's exports came from the land and in proportion to its population New Zealand was the greatest exporting nation. The Dominion's production would have to rise by an average of almost 2½ per cent. each year to meet the needs of the growing population, said Mr. Holyoake.

Little Undeveloped Land

The increase would have to come almost entirely from land now being farmed. Flocks and herds would have to increase by 60 per cent. and there would have to be better-quality animals that would yield more.

The labour force, rural housing, transport, wharves, cool stores, and fertiliser works would have to be expanded to achieve and handle the increases in production, said the Minister. The Government could lay down rules and point the way, but most of the stimulus and drive had to come from enlightened groups such as the Y.F.C. movement and other farm-

Former Dominion presidents of the Y.F.C. federation at the annual general meeting. From left, standing: Messrs. G. W. Guy, East Tamaki (1954-55), O. J. Osborne, Leeston (1953-54), I. G. Tabor, Whakarongo (1952-53), A. O. Lloyd, Tauranga (1950-51), and E. Rabbidge, Wyndham (1949-50); seated: Messrs. F. S. Atchison, Clevedon (1945-46), D. S. Ross, Otumoetai (1941-43), A. C. Cameron, Dunedin (1934-37), T. E. Streeter, Motukarara (1943-45), J. Barclay, Waimate (1947-48), and D. G. McLachlan, Masterton (1948-49).

1—The newly elected Dominion president of the Y.F.C. federation, Mr. G. J. Pullar, Pukerau, being congratulated by the Minister of Agriculture, Mr. K. J. Holyoake. In the centre is a former president, Mr. D. Ross, Otumoetai. 2—The Dominion president of the New Zealand Federation of Country Girls' Clubs, Miss Mary Hopping, Tauriko, and Mr. A. C. Cameron, foundation president of the Y.F.C. federation, in conversation. 3—Mr. Neil Wright, first chairman of the first Young Farmers' Club, Palmerston, lights the candles on the birthday cake. 4—The Mayor of Dunedin, Mr. L. M. Wright, welcoming the delegates and visitors at the annual general meeting. 5—The Dominion organising secretary of the Y.F.C. federation, Mr. S. Freeman, in conversation with Ivan Werner, of Dimboola Y.F.C., Victoria, who is on a 4-months' exchange visit to New Zealand.

ing organisations. The problems of the future would need the best brains available in the farming industry, and the Y.F.C. movement would play an important part in providing future leaders.

Early Leaders

The Minister paid tribute to the enthusiasm of the early leaders of the organisation, including Lord Bledisloe, who was the first grand patron, Dr. C. J. Reakes, a former Director-General of Agriculture, Sir Heaton Rhodes, Sir John Roberts, and Mr. R. A. Anderson. He mentioned especially Mr. A. C. Cameron, the first president, who deserved much credit for the help that he and his staff gave the organisation, and Mr. R. B. Tennent, now Assistant Director-General of Agriculture, "who had a very soft spot for the organisation and did all he could for it". Mr. Holyoake also praised the work of Mr. J. E. Davies, who founded the first club, Mr. S. D. Blomfield, the first secretary, and the present Dominion organising secretary, Mr. S. Freeman.

A Way of Life

Farming was more than an occupation or a trade, it was a way of life. Farming called for the development of the human personality to meet every crisis that arose from day to day and from hour to hour, and the Y.F.C. movement was doing a tremendous lot for the development of young men's personalities.

The diversity of activities in Young Farmers' Clubs, such as stock judging, ploughing, debating, and tours, made the Y.F.C. movement a great rural university, which though it issued no diplomas, enabled its members by their training to take responsible parts in the primary industry, which after all was the oldest and most important industry in the world.

War Memorial Scheme

Mr. Holyoake congratulated the federation on the completion of its War Memorial Scheme, the Lecture Hall at Canterbury Agricultural College and the Dormitory Block at Massey Agricultural College.

The movement had captured the spirit of the times, he said. He urged members to take more interest in international affairs, not just club or national affairs. Young farmers should look to the wide horizon, because no problem could be considered today without considering the problems of the world. He emphasised the value of international exchanges and commented on the fact that of six New Zealanders chosen recently for Rotary Scholarships, three were Young Farmers.

Mr. Holyoake also commended district tours, which enabled members to exchange views on farming problems and to form valuable friendships that would last through life.

History of the Movement

The inaugural meeting of the New Zealand federation was held at Dunedin on 16 March 1934. At that time there were 8 clubs and interest was beginning to spread over a wide area. Boys' and girls' agricultural clubs had been begun in schools shortly after the First World War.

Palmerston Young Farmers' Club, founded by Mr. Davies in 1933, was the first club, and it was followed shortly by the Dunback and Five Forks Young Farmers' Clubs. The lack of opportunity for young men in country districts to extend their agricultural knowledge was the principal reason for the organisation of the clubs, and the spreading of agricultural knowledge remains the basic aim of clubs today.

Within 9 months of the inaugural meeting of the federation there were 38 clubs in the South Island and two in the Wairarapa, where Mr. S. Freeman, then Fields Instructor, Department of Agriculture, Masterton, had become interested in the movement.

Steady Progress

By April 1937, 4 years after Mr. Davies had formed the first club, there were 60 affiliated clubs in the South Island and 58 in the North Island. Club activities had also increased in scope to include many competitions, social gatherings, tours, agricultural weeks, and so on.

In 1936 the federation accepted the offer of the Department of Agriculture, made through the then Director of the Fields Division (later the Extension Division), Mr. R. B. Tennent, to provide the services of a departmental officer as a full-time Dominion organising secretary and the services of the Department's instructors as district organisers and secretaries. Federation headquarters were transferred to Wellington and Mr. S. Freeman was appointed Dominion organising secretary, a position that he still holds.

In 1938 the upper age limit was raised from 25 to 30. A number of national competitions were organised as branches spread in all parts of the Dominion.

Effect of War

When war broke out in 1939 there were 203 clubs in operation, 130 of them in the North Island. The war caused the number of clubs to fall to 62 in 1943, but activity increased from then onward. In 1946 there were 210 clubs active and in the post-war period the number has risen steadily to the present total of 355, with a membership of 10,000.

Dairy Produce Graded for Export

THE following figures showing quantities of dairy produce graded for export during June and for the 11 months ended 30 June 1955, with comparative figures for the same month and 11-monthly period of 1953-54, have been compiled by the Dairy Division of the Department of Agriculture from figures supplied by divisional officers at the various grading ports:—

BUTTER

Period	Creamery (tons)	Whey (tons)	Total (tons)	Percentage Inc. or dec.
June 1955	378	11	389	—
June 1954	482	35	517	—
Increase or decrease	—104	—24	—128	—24.758
11 months ended 30/6/55	147,067	2,991	150,058	—
11 months ended 30/6/54	141,783	3,015	144,798	—
Increase or decrease	+5,284	—24	+5,260	+3.632

Butter in store at 30 June 1955 was 10,246 tons

CHEESE

Period	White (tons)	Coloured (tons)	Total (tons)	Percentage Inc. or dec.
June 1955	1,021	—	1,021	—
June 1954	1,435	7	1,442	—
Increase or decrease	—414	—7	—421	—29.195
11 months ended 30/6/55	77,309	20,556	97,865	—
11 months ended 30/6/54	99,023	226	99,249	—
Increase or decrease	—21,714	+20,330	—1,384	—1.394

Cheese in store at 30 June 1955 was 23,151 tons

If these figures are converted into butterfat equivalent, there is an increase of 2.446 per cent. in butterfat graded for the 11 months as compared with the corresponding period of the preceding season. The above figures refer only to butter and cheese graded for export, and owing to diversions which may take place from time to time they are not necessarily a true indication of production trends.

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Pruning Citrus Trees

THERE is considerable divergence of opinion and uncertainty among citrus growers regarding pruning. Many growers neglect to follow any system of pruning their trees and others, often influenced by their experience with deciduous fruit trees, carry pruning to excess. In this article W. A. Fletcher, Citriculturist, Department of Agriculture, Auckland, discusses the pruning of citrus trees and its importance in the management of an orchard. The author points out, however, that pruning is only one of the operations involved in the production of citrus fruits, and it will prove of little value if other essentials such as correct tree nutrition and soil management and control of pests and diseases are neglected.

[*Sparrow*

A young New Zealand grapefruit tree which has been excessively pruned to remove all lateral branches which are declining in vigour. Early crops are produced on these parts, and their removal will delay trees coming into bearing.

THE main objectives in pruning citrus trees are to establish and maintain a well-balanced framework system, to maintain an optimum balance between tree growth and fruitfulness, and to facilitate certain orchard operations such as spraying, harvesting, cultivation, and disease control. The amount and type of pruning required to achieve these objectives varies with the age, condition, and variety of the tree, but generally a light to moderate pruning is all that is necessary. There is no evidence that normal, healthy trees will derive any benefit from more severe treatment, and it may well result in a considerable reduction of crop.

Plants manufacture the basic foods on which they live within their leaves. Minerals and water from the soil are combined with carbon dioxide from the air to form these substances in the presence of sunlight by photosynthesis. Any appreciable removal of healthy foliage of a citrus tree reduces its capacity to manufacture food and will therefore restrict its ability to grow and bear fruit. Though a stimulation of growth appears to follow the pruning of citrus trees, this is only temporary; total growth is always reduced.

Generally citrus trees make slower response in succulent growth after pruning at any time than do deciduous trees after pruning in the dormant season, and leaf area in relation to numbers of fruits set on citrus trees is generally not increased by pruning as it is on pip and stone fruit trees. Pruning of citrus trees therefore generally reduces yields without compensation in fruit size or quality. With lemon trees, including Meyer lemon trees, the number of fruits set is apt to be excessive and the trees respond to pruning with new leafy shoots more rapidly than do other kinds of citrus trees. Mature lemon trees therefore derive more benefit from pruning than do most other kinds of citrus. A moderate annual thinning of the fruit-bearing wood hastens the fruit to picking size and improves its quality.

Certain mandarin varieties such as Clementine, Scarlet, and Thorny, which have a very dense growth habit, are also apt to crop excessively and produce small, inferior fruits if left unpruned. A moderate annual thinning of the fruit-bearing wood of this type of mandarin tree reduces the number of fruits carried, increases fruit size and quality, and maintains the tree in a healthy, vigorous

General Guide for Pruning of Citrus Trees

TREES should be pruned regularly but as lightly as possible. In general the removal of healthy foliage or interference with the trees' natural habit of growth should be kept to a minimum. Lemon trees and certain mandarin varieties benefit from more pruning than do other kinds of citrus trees.

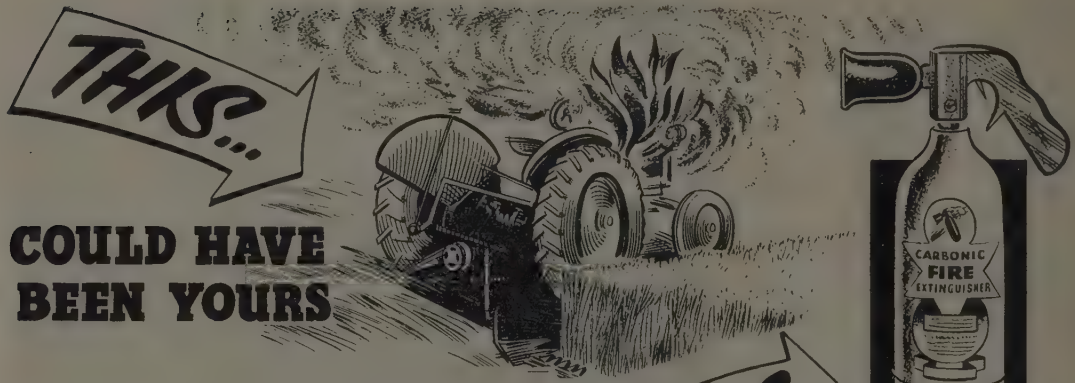
Branches should normally be pruned by being thinned or cut back to laterals. Heading of shoots is usually undesirable.

Young citrus trees normally develop satisfactorily by themselves, but judicious thinning out or shortening of less desirably placed branches can often benefit the growth of a well-formed, sturdy framework of main limbs.

Dead and diseased branches and fruiting wood declining in vigour should be regularly removed from bearing trees.

Low branches should be gradually removed as they decline in vigour, but pruning to raise the skirt should not be excessive, as a large proportion of the crop is carried on this part of the tree.

Excessively long side and top branches should be shortened and the size of large trees should be controlled carefully to prevent crowding and to facilitate orchard operations.



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condition. Other mandarin varieties, however, such as Satsuma and Kara should be treated in the same manner as orange trees.

Natural Growth Habit

Citrus trees as a whole grow naturally into well-shaped trees with rather dense canopies of foliage. Lemon trees are somewhat less compact and regular in form, but fundamentally their habit of growth is similar to that of other kinds of citrus.

Most citrus trees tend to grow upright, and as long as a branch remains upright dominance of its terminal growing portion is commonly very marked and there are few if any laterals.

Eventually, however, the weight of fruit and leaves produced near the end of the branch causes it to assume a horizontal position. Terminal dominance then ceases and lateral buds on the upper side of the branch begin to grow. Usually one of these upright laterals grows more vigorously than the others and becomes the dominant branch. Its vigour usually not only checks the growth of the other daughter shoots, which eventually assume a horizontal position and normally become fruiting laterals, but it also dwarfs the growth of the terminal portion of the mother branch. As the tree ages this natural habit of growth results in the crowding and decline in vigour of the older and lower parts of the tree, and eventually pruning becomes necessary to remove weak and unfruitful wood, particularly in the lower parts of the tree.

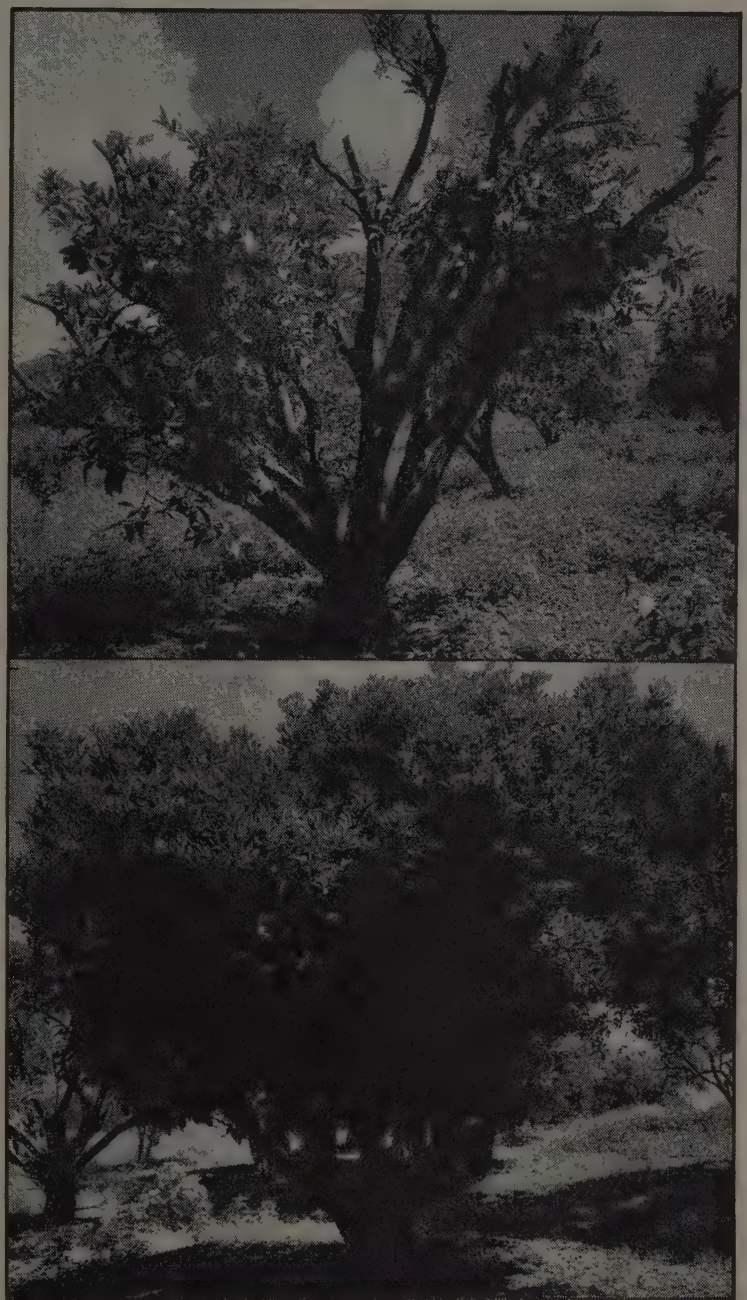
Sucker Growths

It is natural for citrus trees to send up excessively vigorous upright branches, which are commonly known as water shoots or suckers. Some kinds of citrus, particularly lemons, do so more readily than others. Water shoots are often cut out on sight, but this is not always necessary and often creates a worse problem by stimulating the development of additional water shoots. Many suckers can be bent downward and outward to become useful fruiting branches, and sometimes they may be useful in shaping the tree or replacing a broken branch. If they are unsuitably placed they should be removed before they grow large and become difficult to handle.

Pruning and Growth Response

When the terminal part of a citrus shoot is removed or "headed" so that the part remaining ends in a cut new growth is produced only from buds close to the point of cutting. Four or five shoots usually develop, one or two of which, usually the uppermost, outgrow the others and continue to extend vigorously. Eventually the most vigorous shoot becomes the new terminal and the others become lateral branches. This method of pruning markedly accentuates the vegetative

PRUNING CITRUS TREES



[*Sparrow*

Upper—A New Zealand grapefruit tree pruned by severe heading back of the branches. Lower—An adjacent tree similarly pruned the previous season, showing the dense mass of undesirable vegetative growth which has resulted and which now requires further attention. Such severe pruning drastically reduces yields, is wasteful of growth, and should always be avoided.

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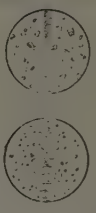

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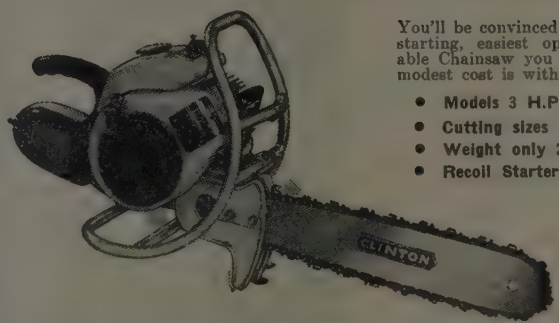

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tendency of the shoot treated. Wherever possible this practice should be avoided, as it delays the development of fruit-bearing laterals and often stimulates unwanted growth which in turn must be removed by pruning.

When pruning becomes necessary it is better to remove parts of a branch by thinning in such a way that some terminal growth always remains intact. This may be the original terminal or a new one created by shortening to a lateral. The effect of this method of pruning is very different from heading; the resulting growth is much less vigorous and is better distributed. None of the buds is given the vigorous stimulus to growth which occurs in heading, and the physiological condition of the branch is much less affected.

It will be obvious that thinning can be practised only on a branched shoot, whereas heading can be carried out whether the shoot is branched or not.

When pruning is being done all cuts should be made neatly and close to the parent branch and if possible in the vertical plane, as wounds then heal over more rapidly.

Season and Frequency of Pruning

The least repression of growth and therefore the best results should be obtained when pruning is done just before buds burst in spring. This gives the tree the use of its full leaf surface all winter and ensures quick replacement of lost foliage by the spring flush of growth.

In practice, however, this work must be done at a time which fits into the general orchard programme and will cause the least loss of fruit. A considerable amount of pruning is carried out by many growers, especially growers of lemons, while they are picking the fruit. Light pruning can be done at almost any time, but pruning in late summer and autumn is generally undesirable because of danger of frost damage to newly stimulated growth.

Should heavy cutting become unavoidable, timing is most important, and the pruning must be done early in spring just before the first flush of growth appears. At this time danger from frosts should be past and there will be ample time for gaps in the tops of the trees to be reasonably well covered by new growth before hot weather occurs.

Light annual pruning is much better than occasional heavy pruning. Excessive pruning reduces yields and should always be avoided.

Tools and Equipment

Only tools of the best quality can be relied on to stand up to continual hard usage and they must be kept sharp if the work is to be done efficiently. Tools and equipment required for pruning citrus trees are secateurs and pruning shears, saws, knives, leather gloves, step-ladders, and a tin of wound dressing.

[*Sparrow*

Lateral growth of a mature lemon tree. The upper growth is strong, healthy fruiting wood, and the lower growth is weak and declining in vigour. Weak fruiting wood should be removed regularly from bearing trees.

Secateurs

Easy-cutting, medium-weight secateurs are preferable and are satisfactory for the light pruning that generally should be all that is required with citrus trees.

Long-handled Shears

Double-purchase shears with handles 24in. long are useful when general renovation of trees involves more severe pruning of heavier branches.

Saws

A curved pull saw with a pointed blade about 14in. long is the most satisfactory type of saw. The curve of the cutting edge must not be too great and the form and set of the teeth must be such as to facilitate quick and easy cutting.

For work in difficult places a frame saw with a removable swivel blade is useful. The blade can be turned to any angle, and it is therefore possible to work in the most acute angles made by crowded branches.

Knives

A good pruning knife for trimming saw cuts and other wounds should have a thin blade of finely tempered steel with a concave cutting edge.

Leather Gloves

A good pair of strong leather gloves will protect the hands from painful thorn scratches when working in citrus trees.

Step-ladders

Broad-based, three-legged step-ladders are generally the most useful. They should be strong but as light as possible and must be kept in thoroughly sound condition. Unreliable ladders are dangerous.

Wound Dressing

Heavy-grade petroleum jelly or bitumastic paint make satisfactory dressings for covering wounds occasioned by heavy cutting.

Pruning Young Trees

Young citrus trees normally develop satisfactorily by themselves and require much less training than do young deciduous fruit trees. Nevertheless a certain amount of pruning can often be beneficial, especially with young lemon trees, which have a more vigorous and irregular style of growth than do other young citrus trees.

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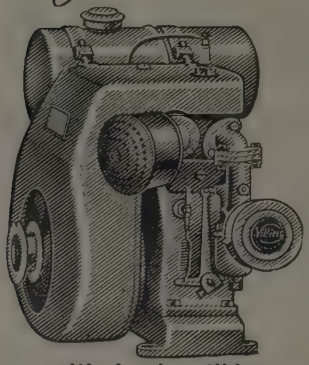

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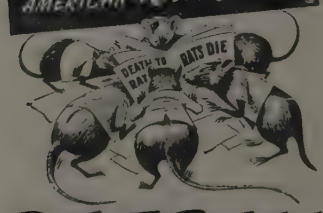

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Young citrus trees are usually received from the nursery with the heads already formed and these are usually maintained in the orchard. If, however, it is necessary to establish a new head after planting, the tree should be cut back to a single rod 18in. to 24in. above the ground and a head should be allowed to develop from three or four of the best-placed shoots that grow from the upper part of the trunk.

During the tree's early years pruning treatment should be directed toward encouraging the development of a framework of strong well-spaced main branches, but this objective can and must be accomplished by a minimum of pruning. Any appreciable reduction in the leaf area of a young citrus tree will dwarf the tree and increase the time it takes the tree to come into bearing.

All shoots which arise from the trunk below the main branches should be removed regularly. Any undesirable branch which might compete with the main limbs or which shows signs of developing into a large branch crossing through the centre of the tree should be repressed by being shortened to a lateral or removed before it grows large. Branches hanging low to the ground from the original head should not normally be removed, as it is on these parts that the first fruits are produced.

Occasionally young citrus trees will make irregular growth with one or more branches longer than the others. Such vigorous shoots may be shortened back to a lateral to retard their growth and the trees normally will soon regain their symmetrical form.

[*Sparrow*

Water shoots are often cut out on sight, but this is not always necessary. A vigorous water shoot arising from the right side of the trunk of this lemon tree has been useful to replace a broken limb and to improve the shape of the tree.

While lemon trees are young they are very vigorous and send up long willowy branches. To reduce the danger of wind damage it is sometimes advisable to shorten these branches by cutting back to laterals, but severe heading to build the tree is not recommended. Such action will stimulate the production of additional shoots of the same kind and will only aggravate the problem as well as increase the time it takes the tree to come into profitable bearing. Eventually these long shoots bear fruits at the ends and bend over. This brings them under control naturally.

Pruning Bearing Trees

Provided they have been well trained at the start of their orchard life citrus trees should require very little pruning in the early bearing years apart from the control of sucker growths. As the trees mature and come into full bearing formative pruning gradually gives way to what may be termed maintenance pruning. With vigorous bearing orange and grapefruit trees this should necessitate very little attention other than the removal of dead and diseased wood to control melanose and stem-end rots and the gradual removal of lower weak and

Grapefruit trees with the skirts raised to about 3ft. above the ground to facilitate control of collar rot. With normal, healthy trees such pruning is unnecessary and greatly reduces the fruit-bearing capacity of the trees.

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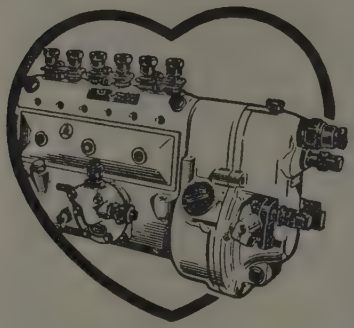

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unfruitful branches that are forced downward by new growth from above and touch the ground. In addition to this treatment mature lemon trees and certain varieties of mandarins require and benefit from a moderate annual thinning of the fruit-bearing wood and the removal of older crowding branches to prevent the trees going into a decadent condition and to stimulate the production of fruit of the highest grade and quality.

Some of the branches of lemon trees may require shortening, as if they are permitted to grow too long, they tend to become spindly and weak. This subjects fruit to excessive rubbing and scratching and may also result in heavily laden branches being broken by the wind.

As citrus trees age moderate thinning of the older and weaker laterals of oranges and grapefruit in particular may be required to stimulate growth of fruit-bearing wood. Pruning for this purpose, however, can be overdone and should only be resorted to when the desired response cannot be obtained by better manuring or by improvement in soil management and disease control.

Opening the tops of bearing trees by removing large branches to let in light and encourage fruiting on the interior parts is not recommended. This practice not only exposes the framework branches to sunburn but also fails by causing the tree to use up plant food to replace the lost foliage with a resultant reduction in yield.

Though the pruning of bearing citrus trees should be based on a minimum of interference with the natural growth of the trees, some attention to control their size and form may become necessary to prevent crowding and to facilitate certain orchard operations such as spraying, harvesting, cultivation, and disease control.

If large trees are not pruned to prevent crowding, their lower limbs will be shaded out and their fruit-bearing capacity reduced. Once this has occurred it is difficult to restore the trees to a satisfactory size without loss of crop. An attempt should therefore be made to prevent trees from reaching a crowded condition by removing each year branches that reach out beyond the desired width. The removal of some of the older and least vigorous branches may also be desirable, but care must be taken not to remove too many branches at one time, as too much pruning may result in a large amount of undesirable vegetative growth. Cutting must always be back to laterals. Once trees have become crowded it is best to take 3 years or more to reduce their size and thus preserve a good balance between growth and fruiting. Where trees are close planted it may be best to relieve the condition by removing trees rather than by pruning. As a result of experience overseas it seems that some crowded orchards may be improved by "hedging", or cutting an aisle 6ft. to 8ft. wide down each row.

[*Sparrow*

A lemon tree in need of pruning to shorten excessively long side and top branches. The limitation of tree size for economic harvesting and spraying is especially important with lemons.

Costs for spraying and harvesting bear a direct relation to the size of the tree, especially its height, and the taller the tree is the greater will be the costs. With lemon trees this factor is important, especially in relation to costs of picking, which are always much higher for lemons than those for any of the other citrus fruits. The limitation of the height of lemon trees therefore has considerable merit, but if it is carried to excess, its advantages may be outweighed by the loss of production. In most circumstances, however, it probably becomes unprofitable to allow lemon trees to grow more than 10ft. to 12ft. high.

Pruning to raise the skirts of citrus trees to facilitate cultivation and to prevent brown rot infection is often excessive and unnecessary. A very large proportion of the best fruit is produced on the lower halves of the trees, so the side branches should not normally be pruned more than just clear of the ground. Though low branches are likely to be the first damaged by citrus brown rot, the disease is so easily controlled by Bordeaux mixture sprays that high trimming of this growth is not warranted. The removal of the lower branches necessitated by their decline will ordinarily keep trees pruned high enough, but in orchards where collar rot or bark blotch has become troublesome it may be profitable to raise tree skirts to about 3ft. above the ground. This practice will encourage better air circulation around and beneath the trees and will relieve humid conditions, which favour the development and spread of bark diseases.

Pruning Neglected Trees

Many orchards at some time or other suffer from neglect, and pruning is

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often a help in promoting their recovery. Before resorting to pruning, however, it is always advisable to remedy those factors which have caused this condition.

The first step is to ascertain whether the trunk and lower branches are suffering from bark disease or the attacks of borer. If these parts of the tree are unsound, renovating should not be attempted; a profitable tree cannot be built on poor foundations.

Trees should then be generously supplied with a balanced fertiliser and early attention should be given to cultivation and disease control, as pruning is useless unless trees are provided with the means to respond to treatment.

All dead and diseased branches should then be removed, and a moderate amount of pruning to remove undesirably placed main branches and old declining growth may also be advisable. However, as much healthy foliage as possible should be saved if the tree is to make the quickest possible recovery.

It is usually a season or two before pruning and better general orchard management will restore neglected trees to natural vigour, when a further moderate thinning to remove undesirable branches and old declining parts can be made. Subsequent pruning should be along the lines described for normal trees.

A well-maintained block of young New Zealand grapefruit trees. Pruning and interference with the trees' natural habit of growth have been kept to a minimum, allowing fruit-bearing laterals to develop right to the ground.

Pruning Frost-damaged Trees

Though frost causes losses of fruit from time to time in the main citrus producing areas of New Zealand, it seldom causes appreciable damage to the trees themselves. If injury should occur, trees will recover more rapidly if pruning is delayed for at least 6 months after the frost. The extent of the damage will be known by that time and unnecessary pruning can be avoided.

Once new growth has become reasonably well established the tree may be pruned to remove dead wood and to control the distribution of new branches.

Large grapefruit trees nearly 40 years old. The trees are still vigorous, but their lower limbs are shaded out by crowding. Total bearing surface has been reduced and the trees are so high that picking and spraying are difficult. The trees should have been prevented from reaching this condition by careful pruning earlier.

Treatment of Wounds

Large wounds made in pruning are subject to attacks by certain fungous diseases and by the citrus borer (*Oemona hirta*). It is important, therefore, that such wounds be protected as quickly and effectively as possible. Cuts greater than 1in. in diameter should be trimmed neatly with a sharp knife and then carefully covered with bituminous paint or heavy-grade petroleum jelly. The dressing should be renewed from time to time while the wound is healing. Lead paints do not make very satisfactory wound dressings, as they soon dry out, crack, and lose their protective qualities.

The application of a disinfectant before the use of a wound covering can be beneficial, and acidulated mercuric chloride is recommended for this purpose. It is prepared by dissolving 1 gramme of mercuric chloride in 15 c.c. of concentrated hydrochloric acid and adding this solution to 1000 c.c. of water. Metals should not be allowed to come into contact with the solution, which should be stored in a glass-stoppered bottle and labelled "POISON—Not to be taken". Growers are advised to seek the assistance of a chemist in making up this disinfectant solution.

Disposal of Prunings

All diseased branches should be carted out of the orchard and burnt as soon as possible after they have been removed from the trees. Large healthy limbs and any smaller branches which are too hard to be cut up by cultivating implements must also be carted away before they become a nuisance. Smaller prunings from healthy trees can be worked into the soil when the land is cultivated.

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Trees on the Farm

Farm Forestry Competitions

ADVANCES in farming practice have received great impetus from the holding of shows, field days, and competitions. The spread of ideas and the encouragement derived from such functions do more good than any amount of propaganda. Trees, whose establishment and care are not usually given the publicity enjoyed by other aspects of farm improvement and whose value and usefulness often go unnoticed, were the subject of a competition in the Wairarapa described in this article by W. H. Jolliffe, Officer in Charge, Extension Forestry, New Zealand Forest Service. This is the sixth article in a series on trees on the farm which has appeared in consecutive issues of the "Journal" since March.

FARMERS in some parts of New Zealand have over the years been keenly alive to the value of shelter belts and woodlots in thrifty farm management. Of their own initiative they have established trees and encouraged others to do likewise and so made their localities outstanding in beauty and farm economy. That parts of the Wairarapa show this enthusiasm for trees was evident in a competition conducted by the Wairarapa branch of Federated Farmers.

Classes in the competition were:—

1. Best tree-planted dairy farm in each county.

2. Best tree-planted sheep farm in each county.

3. Best tree-planted farm (any type, any county) since 1940.

4. Best silviculturally treated woodlot (any county).

From the winners of the above was to be selected the over-all champion in the Wairarapa.

Good Entries

The number of entries (over 60) showed the popularity of the competition. Three local officers of the Departments of Lands and Survey and Agriculture and the New Zealand Forest Service were the judges. Points were awarded for the general plan of tree planting, the care of indigenous trees and natural woodlands, the use of trees for shade and shelter, the use of trees for soil and water conservation, the use of trees for ornament, the use of trees for timber and other products, continuity of planting, and silvicultural practices.

Cups were donated by prominent people in the district and were presented to winners by the member of Parliament for the district, Mr. B. V. Cooksley, at a special meeting of the branch at which the intention to repeat the competition in probably 5 years' time was announced.

It was generally felt that much good had come out of the competition. Comment and advice given on competing farms and the judges' report were of great assistance not only to the competitors but to those in whom the competition had stimulated a desire to make their farm improvement embrace farm forestry.

Some parts of New Zealand that are badly in need of trees for beautification, shelter, or economy would be well advised to follow Wairarapa's lead by organising similar competitions.

The over-all champion in the Wairarapa. Snug homestead and well-sheltered paddocks.

CURRENT WORK

Those who intend raising their own tree stocks for planting out next year should have preparations well in hand. Formation of the bed, sowing, and protection will be dealt with in next month's article, but meantime the ground should be well dug if this has not already been done. If cone-bearing trees are being grown, lime should on no account be applied to the soil.

If it is intended to lift the young plants when 1 year old, 1 sq. yd. will accommodate 600 trees, but if they are to remain until they are 2 years old, only 150 can be expected from that area.

The germination of the seed to be sown, if not already known, should be tested immediately. The simplest method is to count out a certain number of seeds (say 50) and place them on a piece of blotting paper in a shallow dish left undisturbed for the period of the test. The blotter must be kept moist but not wet and be placed away from the direct rays of the sun. As the seeds germinate they should be removed and the daily number so removed should be recorded. At the end of the period (usually 28 days) the total germinated in relation to the number put on test will give a guide to the density at which the seed should be sown later.

Above—Best tree-planted farm since 1940. Below—Best silviculturally treated woodlots surrounding homestead and home paddocks. Photos on this and opposite pages by the New Zealand Forest Service.

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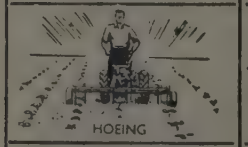

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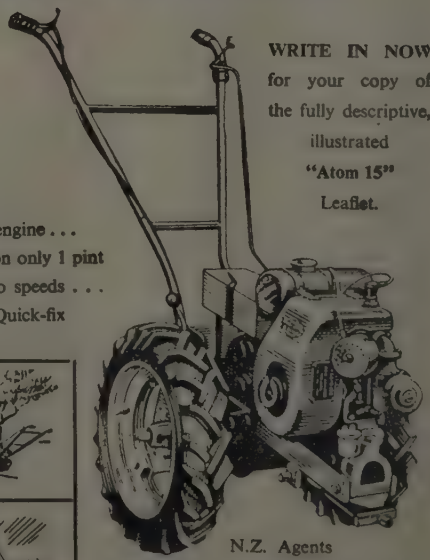

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Pure Seed Production

THE high reputation that New Zealand seeds have at home and overseas has largely been established through the Department of Agriculture's seed certification scheme, by which the quality of seed is assured to buyers. Equally important in the maintenance of pure seed is the work of the Department in multiplying small reselected lots of seed preparatory to their release into commerce under certification. An outline of this work and its value to this country's export trade is given in this article by N. L. Shillito, Seed Production Officer, Department of Agriculture, Christchurch.

An increase block of Hilgendorf wheat being searched for off-type plants.

THE New Zealand seed certification scheme enables small quantities of nucleus lots of reselected seed to be multiplied rapidly for use by all farmers desiring supplies of these strains. The Department of Agriculture is responsible for taking the small lots of seeds made available by the Department of Scientific and Industrial Research and multiplying them to quantities which can satisfactorily be released into commercial channels. The selection work of the Department of Scientific and Industrial Research ensures that the seed used at the start is of the highest standard and the subsequent careful multiplication carried out by the Department of Agriculture ensures that that standard is maintained.

Method of Carrying out Increases

Usually the material made available to the Department of Agriculture is multiplied a stage under contract with a selected farmer before being distributed to other approved growers, though modifications of this general procedure may be made in special cases. With wheat, for instance, where relatively small areas of a number of varieties are required the grower is paid compensation for the use of the

Onward peas are sown in wide drills to facilitate inspection during growing.

ground and the Department itself sows and harvests the crop.

Precautions Taken

Whatever the method of increase adopted, the primary object is to avoid any introduction of impurities either from previous crops or from sowing or harvesting equipment. Special care is taken in the selection of an area for the purpose. To ensure further that growing crops are true to type and free from impurities careful rogueing is carried out during the growing season. This operation results in the standard of purity being maintained up to the harvesting stage.

Particular care is also taken to see that contamination from harvesting machinery does not arise. Normally it is sufficient for the threshing of the contract area to be preceded by the threshing of a very different kind of seed. For example, it would be quite satisfactory to precede the threshing of a paddock of oats with one of ryegrass or peas, as both seeds are very different in size from the oats. However, it would be most unwise to precede oats with either wheat or barley or with other oats. When this precaution is not possible the header must be completely cleaned down. To do this thoroughly 2 men usually take up to 2 hours with an air compressor. Similar precautions are taken to ensure that admixtures cannot occur during the machine dressing of the seed.

Scope of the Work

The following table indicates the areas required to be grown under contract to or under the direct supervision of the Department of Agriculture each season for reasonable supplies to be maintained:—

	Acres
GRASS SEEDS	
Perennial ryegrass	80
Short-rotation ryegrass	60
Italian ryegrass	20
Cocksfoot	25
Timothy	10
CLOVER SEEDS	
Montgomery red clover	40
Cowgrass	20
White clover	50
OTHER SEEDS	
Lucerne	20
Wheat	20
Oats	40
Barley	30
Ryecorn	20
Garden peas	60
Rape, kale, and chou moellier	25

The following table shows the pay-outs made for seed harvested from contract areas in 1952-53:—

	£
Grasses and clovers	11,211
Cereal and pulse crops	3,725
Other crops	1,017
Total	15,953

The value of this work is very far reaching, as the multiplication through several stages of the small lots of seed produced leads into the widest spheres of seed production in New Zealand. As an indication the acreage of seed harvested in 1952-53, which had its direct origin in the production programme described in this article, ran well into six figures and exports of seed from that harvest reached £2,000,000.

In New Zealand the certification scheme has enabled farmers to purchase seeds of known origin grown from reselected strains which can be sown with an assurance that they are true to name. The seed distributed by the Department after growing through one or more multiplications is vital to provide sufficient seed for sowing ordinary pastures and crops for general purposes, if the high standard of strain quality present in the initial selection is to be maintained. In this way the certification scheme makes provision for a reasonable supply of seed for all purposes within the country and the surplus not required for ordinary sowings is available for export.

Book Review

"Research for Plenty"

THIS is the title of a book comprising eight broadcast talks from the B.B.C.'s Third Programme in 1952. The talks were given by well-known figures in eight different fields of applied biology—agriculture, botany, plant pathology, soil science, physiology, zoology, marine biology, and biochemistry. These subjects were deliberately chosen as covering the wide general field of study of that complex process known as photosynthesis, whereby the free energy of sunlight is stored in plants for human and animal food.

As the title implies, the general theme is food supplies, but emphasis is on the more distant future, because though there is little doubt that, theoretically at least, the present world population could be fed at a reasonable standard of nutrition, there is considerable doubt about the possibility of feeding a population twice or three times as large as the present one.

It is natural therefore that some of the speakers should dwell on the more remote aspects of agricultural research such as the conversion of green leaves directly into edible protein without the agency of livestock. Most of the material, however, centres round improvement in, and application of, known techniques such as increase in yields through use of fertilisers, reduction of losses through disease and insects, irrigation, and plant and animal breeding and husbandry.

Because the fields covered are very wide and the talks were for general broadcast, there is an absence of complex technical terms and any of the talks can be readily understood by those with an elementary knowledge of agriculture.

The general note is one of restrained optimism, depending to some extent on the philosophy and viewpoint of the reader. It would be interesting to see the B.B.C., if it has not already done so, tackle the same problem from other approaches. The world food problem may be basically one of understanding and perhaps imitating the process of photosynthesis, but there are other important limiting factors which could be dealt with by the engineer, the economist, and the social scientist, and there is certainly scope for contributions from both medical science and theology if a complete picture is to be obtained. However, despite their limitations the talks must have gone a long way toward their objective of furnishing knowledge and promoting interest and thought in a problem which, while it may become more acute for our great grandchildren, is with us now.

—*J.V.W.*

Geoffrey Bles. 5s.

Publications Received

"Farmer and Stock-breeder Year Book 1955", Farmer and Stock-breeder Publications Ltd., Dorset House, Stamford St., London. Price in Great Britain 10s. 6d. (postage 6d.).

"Farmers' Yearbook, 1954-55" (with British breeds guide and directory). The Tantivy Press, Tibberton, Gloucestershire. 9s. 6d. net.

"The Production of Pig Meat from Garbage and Food Waste"

BULLETIN No. 371, "The Production of Pig Meat from Garbage and Food Waste", a new publication issued by the Department of Agriculture, aims to show that this type of pig production can be carried out easily and pleasantly provided reasonable care and attention are given, first, to the planning and construction of the plant, and second, to its handling and maintenance.

No attempt is made to lay down standard plans for cookhouses or piggeries, as these must be constructed to suit the site available. Examples of one or two efficient plants are given and the basic principles necessary to easy and hygienic operation of garbage plants are stated.

The bulletin is available post free from the nearest office of the Department of Agriculture, or from Publications Section, Department of Agriculture, Box 2298, Wellington.

Deep-litter and Straw-yard Systems for Commercial Egg Production

IN the July issue of the "Journal" F. C. Bobby, Superintendent, Poultry Industry, Department of Agriculture, Wellington, described in detail the deep-litter system for commercial egg production in Britain. This article makes further reference to the deep-litter system and then describes another British system for maintaining laying birds.

THE detailed description of the deep-litter or built-up litter system given in last month's "Journal" shows that there are three essentials for the success of this system. These are controllable ventilation, conservation of warmth in the laying house, and the correct litter. It is of interest now to consider whether the deep-litter system is of economic importance to commercial poultry farmers in New Zealand and, if so, whether these essentials can be attained on an average poultry farm.

Deep-litter System

It is common practice in countries where winters are severe to give good protection to laying birds to aid in satisfactory winter egg production. Practical experience has shown in these countries that laying pullets respond to warm housing conditions and electric lighting during winter. Since the last war commercial egg producers in Britain, wishing to obtain maximum winter egg production when egg prices are high, have turned to the laying battery and deep-litter system, because these systems supply the optimum conditions for their pullets. Before the war the semi-intensive and fold-unit systems were the most popular methods of running laying pullets. Maintaining pullets under intensive conditions was uncommon.

New Zealand spreads over a wide area running approximately north and south with consequent marked variations in climate, the winter in the north being far less severe than that in the south. Despite this difference there is comparatively little difference in the orthodox type of laying shed in both islands. It is reasonable to question whether the same type of laying shed can be the most suitable for satisfactory winter egg production in both islands. Significantly, some attempt has been made in the South Island to give limited added protection to the birds from winter conditions, in some cases by building laying houses which are lower at the front than at the back (that is, the reverse to the normal type of laying house) and in others by reducing the area of open wire netting at the front. Thus the further question arises: Would **consistently** better winter egg production be obtained in New Zealand's colder districts if the deep-litter system was adopted? This is a possibility worthy of consideration.

Obviously the first point to consider is: Can the present orthodox type of lean-to poultry house be used for the deep-litter system? If two of the conditions described for the deep-litter system are in fact essentials, it would appear that the lean-to type of poultry house is not suitable for this system. Reference is made here to controllable ventilation and the conservation of warmth in the house. These two conditions cannot be attained in an open-fronted, lean-to house. If protection is placed over the open front to conserve warmth, light and ventilation immediately become inadequate. Without protection over the wire netting uncontrolled cold air pours in both day and night and is in fact often respon-

HEADING PHOTOGRAPH: Growing pullets on a straw yard at the National Institute of Poultry Husbandry, England. Ark houses are being used to house the birds. Corrugated iron has been fixed at the bottom of the fence surrounding the yard to protect the birds from ground draughts. The birds look healthy and well grown.

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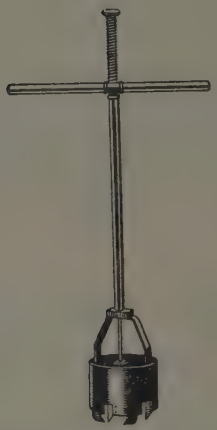

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sible for the damp condition of the litter in winter. These conditions are not conducive to high winter egg production, particularly from light-breed pullets.

The fact that long or chopped straw is not suitable for the successful building up of deep-litter presents no serious difficulties. Sawdust and wood shavings are available in this country.

The time has arrived when the deep-litter system, in the same type of housing as used overseas, should be given a proper test in this country, preferably in one of the colder districts. Full consideration will be given by the Department to erecting a deep-litter house of moderate size at the Poultry Demonstration Plant, Upper Hutt. As winter conditions in the Hutt Valley are usually cold, a fair test should be possible. If the test is successful, South Island poultry producers in particular may be well advised, when building new housing, to consider the deep-litter system for use in laying sheds with full-span roofs.

Deep-litter System and Disease

The retention in a laying house of litter for 2 or more years gives rise to the question: Does the deep-litter system subject pullets to any greater risk of disease? Authorities on this system in Britain do not consider that laying pullets are subject to greater risk. There is no evidence to show that in adult pullets leucosis (fowl paralysis) is transmitted from bird to bird by the droppings. Internal parasites such as coccidia and worms are substantially controlled if the litter is correctly managed and heat from fermentation generated, but care should be taken that external parasites such as mites and fleas do not become established.

Authorities in Britain are much more guarded in regard to disease risks for chickens during the brooding stage in the deep-litter system. Here it is considered that a heavy infestation of coccidia can build up before the heat of fermentation can check it. Furthermore it is obviously dangerous to use old deep-litter material from laying houses to start activity in litter in brooder houses. This can easily carry the virus of fowl paralysis from the adult birds to chickens, which can be readily infected during the first few weeks of life.

Straw Yards for Commercial Egg Production

Since the last war a further system for maintaining laying pullets has been developed in Britain and has become reasonably popular. In brief the straw-yard system consists of an open-fronted house of limited width with an outside run of deep, built-up straw.

The run is confined within fencing the lower portion of which is usually solid to contain the straw and to act as a windbreak against ground draughts.

Rhode Island Red pullets in a straw yard. The mash is provided in metal hoppers outside. Here no protection has been given from ground draughts.

This system is particularly suitable for general farmers who in many cases can convert farm buildings into poultry houses and have an abundant supply of straw for the outside runs.

Two square feet of floor space per bird should be allowed in the poultry house, and a further 4 sq. ft. per bird should be given in the straw yard outside. Thus an ordinary lean-to, open-fronted laying shed can be made to carry double the number of birds as compared with the number when birds are run intensively, when 4 sq. ft. of floor space per bird is the minimum requirement. Most of the laying shed is occupied with perches and nest boxes. In fact, the house mainly serves to give shelter to the birds at night and during rain.

The yard outside must be well drained so that in heavy rain water will not accumulate under the straw. Drainage under the straw may be improved by putting down a thick layer of rubble or large stones on the earth. Concrete yards are expensive, not necessary, and consequently not recommended. The fence surrounding the yard should be approximately 8ft. high, thus allowing for the straw to build up inside over the year and still leave a minimum of 6ft. of wire netting from the top of the straw. At the bottom of the fence should be placed corrugated iron sheets, sacking, or brushwood to a height of about 2ft. 6in. to 3ft. to contain the straw and to protect the birds against ground draughts.

At least a foot of straw is put down in the yard to start with and is added to regularly as the straw is trodden down and soiled with droppings or becomes sodden with heavy rain. It is obvious that this system consumes a large amount of straw and will not be suitable for places in New Zealand where straw is expensive. On the other hand in grain growing districts, where straw is available in quantity, this system could be used with advantage.

Straw yards have been built at the Poultry Demonstration Plant, Upper Hutt. A full description of the experience gained with these yards will be published after birds have been run under these conditions for a laying season. It is already obvious that the amount of straw needed makes the system uneconomical in areas where straw is bought at, say, 8s. 6d. per bale.

Birds are maintained for a year on these yards and at the end of this time the straw is completely removed, fresh litter being used for the next season. It was of interest to note in Britain at the National Institute of Poultry Husbandry that a straw yard had been used successfully for raising growing pullets after the brooding stage.

Care of Livestock during September

Contributed by the Animal Research Division

CARE OF EWES WITH TWIN LAMBS

FOR the first month or 6 weeks of life a lamb depends almost entirely on its mother's milk. Ewes are capable of producing more milk than a single lamb can drink in the early part of lactation. Twins, on the other hand, can soon drink all the milk which the ewe can produce. For this reason ewes with twin lambs should be drafted off and grazed together on good paddocks. Separation is most easily done immediately after lambing.

ROTATIONAL GRAZING OF CALVES

During the last 8 years well-reared heifers at Ruakura have out-produced their poorly reared mates by an average of 15lb. of fat in the first lactation when both groups were well fed after calving. Frequent changes to good clean pasture are essential if calves are to be successfully reared. This rotational grazing avoids deaths in winter, eliminates the need for drenching against worms, and produces yearlings 100lb. heavier than those kept in the one paddock for weeks at a time.

FEEDING THE MILKING HERD

Autumn-saved pasture is almost equal to high-quality spring pasture as a milk-producing fodder. It should, therefore, be rationed to the milking cows to make it last until the spring feed comes away and hardens up. An electric fence is essential for efficient utilisation, enabling the pasture to be grazed in small breaks. Unless sufficient reserves of this pasture are available for full feeding, the remainder of the feed should be made up with silage. Make sure enough hay is retained to balance the lush spring growth.

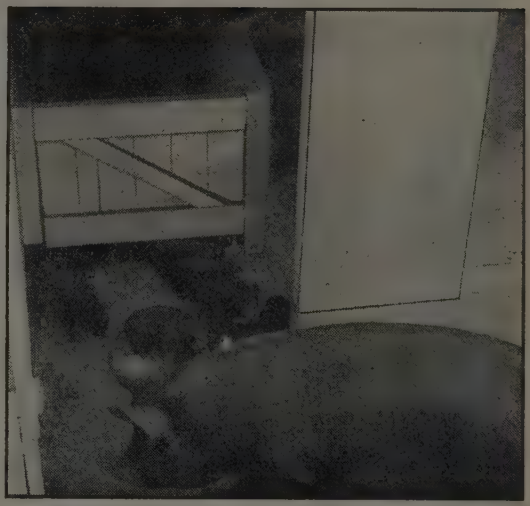
When the autumn-saved pasture is finished the herd should be rotated round the farm. Paddocks should be small enough to maintain a concentration of 20 to 30 cows per acre. If necessary, larger paddocks can be subdivided with the electric fence. The aim should be to graze pasture when it is 4in. to 6in. high, as it is then at its most nutritious stage. Cows should not be kept for more than 1 or 2 days in the paddock. If necessary, cleaning up after them should be done with dry stock.

VACCINATION AGAINST SCABBY MOUTH

On farms where scabby mouth occurs each new crop of lambs should be vaccinated, and this is most conveniently done at marking. If lambs are not protected, they are liable to suffer a severe check, as the disease makes eating very painful. The vaccine gives very good protection if properly used. Care is necessary to keep the needle prong clear of grease, as if it becomes blocked, no vaccine is applied and lambs may still be susceptible. Ewes which have not previously been exposed to the disease should be vaccinated at the same time as their lambs.

COCCIDIOSIS IN POULTRY

To prevent coccidiosis in chickens it is necessary to keep them growing steadily. Any check is dangerous. Cleanliness is very important, as the disease spreads through the soiling of food by droppings. If an outbreak occurs, sulphamezathine or sulphaquinoxaline should be used in the drinking water. Full particulars of dosage may be obtained from the Department of Agriculture's Poultry Instructors.



["New Zealand Farmer"

A well-planned creep at the side of the sleeping floor. Creep feeding is a very important factor in the production of heavy weaners.

CARE OF PIGS

Late farrowed spring litters should receive special attention, as they will be approaching weaning age. Creep feeding is a very important factor in the production of heavy weaners, and best results will be obtained by having a supply of meal and milk always before the litter. Weaned pigs must be well fed, and if meal has been used before weaning, its use should be continued for at least a fortnight to avoid an after-weaning check. The meal ration will be reduced as the skimmed milk supply increases. It is preferable to feed weaners with meal up to half their daily rations and give the milk saved to the store pigs rather than feed meal to the older pigs at this stage.

After weaning sows should receive sufficient milk and meal to enable them to regain the weight lost during previous suckling. They should be hand-mated, and once safely in pig may be allowed to subsist on good pasture.

MASTITIS

Mastitis is usually most prevalent in spring. Milk from all quarters should be carefully examined each day in a strip cup. If there is any abnormality, the quarter should be treated without delay, three tubes of penicillin cerate being used at 24-hour intervals. Prompt treatment at this time of the year will greatly reduce loss in production from light or dry quarters.

X CHICK DISEASE

The work carried out on X chick disease during the last 2 years has shown it to be a form of vitamin E deficiency, possibly arising from the feeding of certain batches of wheat. Outbreaks of X chick disease have been confined so far to the South Island, and poultry farmers in the areas affected in previous years are advised to add 5 per cent. wheat-germ meal to the chick mash as a precautionary measure.

An article describing the results of the investigation carried out on this disease appeared in the September 1953 issue of the "Journal of Agriculture".

Pasture Seed and Fodder Crop Production

Seasonal Notes by the Extension Division

FOR pasture seed production simple mixtures should be sown (for example, perennial ryegrass and white clover) and grazing should be managed so that grass or clover dominance is secured at the appropriate time for harvesting.

RYEGRASSES USUALLY the first-harvested crop of ryegrass species is most profitable, but care in grazing management is necessary from establishment to seeding. Plants must be allowed to make leaf growth. Close and continuous grazing is not recommended for either seed production or good pasture. In autumn and early spring it may result in clover dominance with a resultant poor yield of ryegrass, and with both short-rotation and Italian ryegrass it can ruin the pasture for seed production. Grazing should be managed to maintain plants at a uniform level of approximately 1in. for perennial ryegrass and 1½in. to 2in. for short-rotation and Italian. The time when areas should be closed for seed will depend on the district, but it should not be later than the first fortnight in October or when the seed head is in the shot blade.

WHITE CLOVER Spring management of white clover consists of reasonably close grazing in early spring with an easing up as spring advances. An important bearing on seed yield is the time of closing, and experience indicates that the last week in October to the first week in November is the best time, at which stage occasional flower heads appear. Earlier closing has a tendency to produce bulk, which hampers drying at harvest. Paddocks may be closed later than the times mentioned, but reduced yields can be expected. Areas that contain a high percentage of suckling clover but otherwise are promising crops can be closed in early spring for silage, which is cut about the last week in October. If a white clover seed crop is then taken, it should be almost free of suckling clover.

RED CLOVER The general practice for broad red clover is light grazing in early spring and closing for hay about mid-October, cutting early in December, and then allowing the crop to seed. With Montgomery red clover the practice is to graze until about mid-December and to top to even up the area before it is closed for seed. In either case the crop can be grazed or a hay crop can be taken, depending on the feed situation for the particular season.

—C. C. LEITCH

* * *

RAPE THE farmer's choice of rape varieties is limited to three. For medium and heavy soils, particularly if second growth is to be relied on, Broad Leaf Essex is to be preferred. Giant rape is best suited to lighter soils of medium fertility and Club Root Resistant is recommended on soils subject to club root disease. When the rape crop follows a brassica crop Club Root Resistant rape should be sown as a precaution. Neither Giant nor Club Root Resistant when ready for feeding presents the colour change characteristic of mature B.L.E. rape. On foothill areas it is common to sow a grass seed mixture with the rape crop. Though this practice is not generally recommended, satisfactory results can be achieved, but if a satisfactory pasture is to be established, the seeding rate of the rape should not exceed 1lb. per acre. Farmers have found it advantageous to step up by 5lb. or 10lb. the ryegrass constituent of the grass seed mixture. Rape is frequently sown in breaks to allow a greater spread of production. Generally two such sowings in November, one early and one late, are sufficient. Break feeding is recommended, as the crop can be used better in this way. Where grass seed is sown with rape, back fencing of fed-off breaks is recommended to protect the young grass.

TURNIPS Turnips are frequently the first crop taken in the rotation after run-out pasture is broken up. Surface working is usually done to break up the turf. This is followed by deep ploughing, which should be done early enough to allow the old turf to rot down sufficiently to ensure a firm seed-bed. In the South Island a turnip crop is normally required for feeding during June, July, and August, but in the North Island it is required for the summer supplementary feeding of cows from February to March. In Canterbury N.Z. Green Globe is usually preferred for winter feed and may be sown from late November to early February. If, however, later sowings have to be made, N.Z. York Globe, a quicker-maturing variety, should be used. It can safely be sown up to the end of February, and though it is a quicker maturing variety, it will keep well into August. Yellow-fleshed turnips are best suited to cool climates and high-altitude areas. For summer supplementary feeding the crop should be sown in October and two sowings should be made about 2 to 3 weeks apart. For the first sowing N.Z. York Globe and N.Z. Red Globe should be used; for later sowings N.Z. Red Globe and N.Z. Green Globe are recommended. Turnip seed is normally sown in 7in. drills at 8oz. to 12oz. of seed per acre with 1½cwt. to 2cwt. of reverted superphosphate.

—W. V. HADFIELD

* * *

SWEDE CROP THERE is available to the farmer a range of swede varieties to provide feed from April to September. For feed in April or May N.Z. Superlative variety probably has no peer. This variety should not be grown or kept for late feed, as when it is mature it will rapidly deteriorate if attacked by dry rot. For late feeding there is N.Z. Wilhelmsburger, which, though smaller in the bulb than other varieties, has equal feeding value because of its higher dry-matter content. Between these early- and late-maturing types is an intermediate group consisting of N.Z. Grandmaster, N.Z. Sensation, N.Z. Calder, and N.Z. Crimson King. Grandmaster is a good all-round swede, is capable of high yields, and does well on the heavier lands. Sensation and Calder have a high degree of resistance to aphis or blight attack and should be grown where there is likelihood of aphis causing damage. Their deep-rooting character makes them logical choices where soil conditions are likely to become dry. Crimson King finds favour on ridgy country and is possibly slightly later in maturity than Grandmaster. The new N.Z. Wye swede has shown high resistance to club root and its sowing is recommended to farmers who have to sow swedes after a brassica crop. Wye swede is mid-maturing and has a palatable bulb, but stock are inclined to neglect the shaws.

—J. G. RICHARDS

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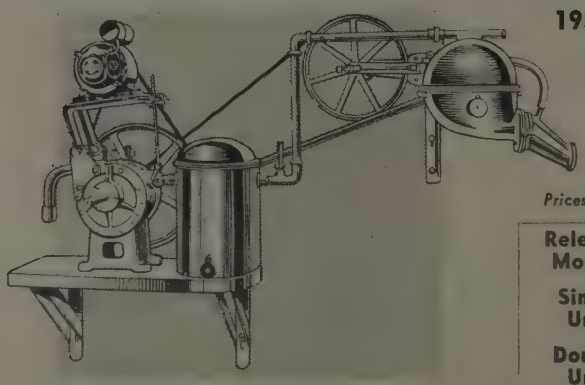

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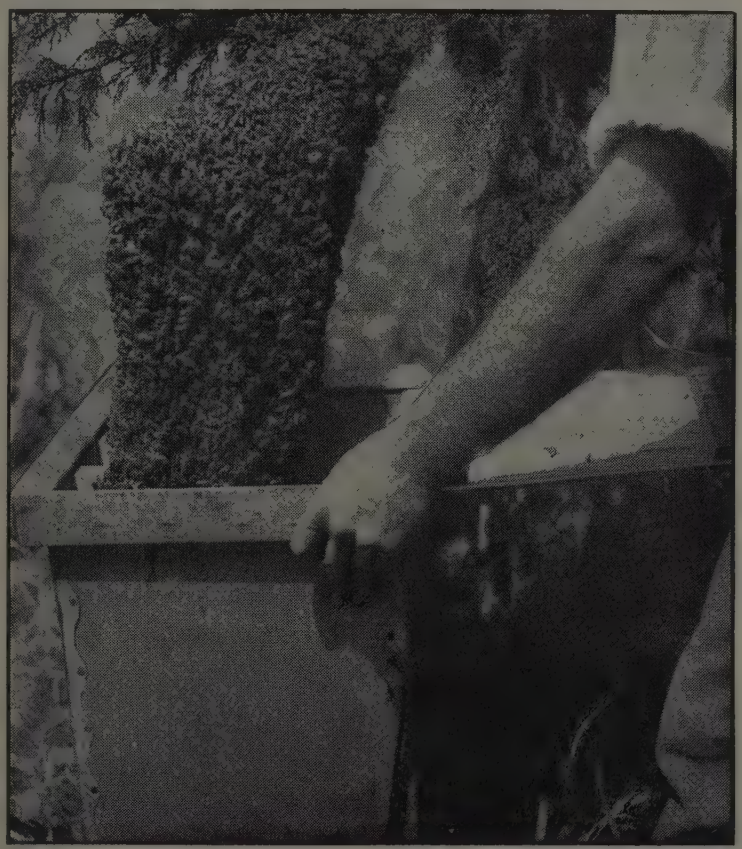
Handling Swarming Bees

SWARMING bees are usually quiet and easy to handle if taken within a few hours of clustering, but they may become restive and vicious if they are disturbed after long periods out in the open. In this article S. Line, Apiary Instructor, Department of Agriculture, Invercargill, describes conditions when protective clothing is necessary to handle a swarm of bees in safety.

A SWARM of bees when in flight or when newly settled on a post, bush, or tree is usually in a good humour. Being well filled with honey, which they take into their honey sacs before swarming, they will remain contented until in a day or so they have consumed the honey to maintain warmth and energy or converted the honey into wax comb.

It is not usual for bees to convert honey into wax until they have established themselves in some permanent quarters protected from the weather. On rare occasions, however, a swarm may remain in the open, produce wax comb, and attach it to the surface of the temporary resting place. This induces them to stay for a longer period or until, in this unsheltered position, they die through exposure to severe weather. Often the comb so built will not be seen by the person intending to capture the bees, for it is covered by the mass of bees and obscured. This is where the person concerned can run into unsuspected trouble, because these bees could be without much food and ready to sting if disturbed.



[*Green and Hahn*

A swarm of bees is usually easy to handle if taken within a few hours of clustering.

Honeycomb built by a swarm of bees in the open on a tree. When the photograph was taken most of the bees had been removed to a box.

The illustration above shows comb attached to branches of a walnut tree in Invercargill by a swarm settled there. A box was suspended under the cone of bees and the branch given a sudden shake from about 12ft. from the ground by a person on a ladder. Immediately a large number of the bees attacked this person. When the bees fell from the branch the beeswax was revealed and accounted for the bees being probably hungry and prepared to be vicious.

When a swarm is being collected it is desirable to know what might be the possible dangers and to wear clothing which will give protection for any eventuality.

Wool Shed Design and Construction

By J. E. DUNCAN, Wool Supervisor, Department of Agriculture, Wellington

INFORMATION on the basic points to be considered in planning a new wool shed or remodelling an old one is today in ever-increasing demand and this article attempts to supply it concisely. The aim is to give enough instructions and plans to save intending builders from making mistakes which perhaps they will regret for the whole life of the shed. Consideration is given to what might be described as the "standard" type of New Zealand wool shed, a straightforward rectangular design which satisfies the majority of requirements. This article will be given in two sections; the second will appear in next month's "Journal".

THERE has not been the same standardisation of wool sheds that has occurred with milking sheds, probably because there has never been the same intensive study of the problem, or because sheep farmers tend to be more individualistic. However, enough information is available from the best existing sheds to enable a useful beginning to be made on the problem.

From inquiries received and the visits of Sheep and Wool Instructors to individual farms it is quite evident that the main demand today is for 2- or 3-stand wool sheds. Some want only one stand, possibly combined with an implement shed, and a few want four stands. The demand for anything larger than this is now very rare. There is no question that a well-designed shed is a good investment and like the high-producing animal it goes on paying dividends at no higher maintenance cost than the poor specimen.

Size

Size, both in number of stands and actual floor space, is one of the first considerations. Number of sheep to be shorn is obviously the first consideration, but allowance is often made for an expected future increase in the size of the flock.

The time that shearing takes depends on the number of shearers employed, their speed and skill, the amount of wet weather usual at shearing time—considered in conjunction with night-pen capacity for holding sheep under cover—and various other factors. Each prospective builder will juggle the

HEADING PHOTOGRAPH: A typical New Zealand layout, with wool shed, yards, and dip designed as a unit.

known and unknown quantities and find his own answer. Night-pen capacity is not generally less than half a day's normal shearing, though farmers in the wetter districts often like more —up to as much as a full day's shearing under cover.

In the accompanying plans a compromise of 100 to 150 sheep per stand has been allowed for night-pen capacity, but as will be seen later, this has been attained at a minimum of expense. As the result of many measurements taken over a number of years the writer has come to the conclusion that the necessary allowance for night-pen space varies from 3 sq. ft. per sheep with Merinos to 4 sq. ft. for big Romneys. In the plans figures have been given for both extremes, so it is

At right—The follow-through principle. The wool travels from the board to the table, to the bins, and to the press by the most direct route.

easy to estimate what the shed will hold.

A criticism which might easily be made is that in all the plans the wool rooms shown are too large, especially as with rapid extension of good roads it is now becoming unusual to have to hold over many bales in the shed. The reply is that in the first place it pays to have plenty of light and space when classing wool if the job is to be worth while; in the second place the space below the wool room is put to excellent use for holding sheep, so the roof on that section of the shed is serving a dual purpose; and lastly the saving in expense by shortening the wool room is small and hardly worth while compared with the loss in holding capacity in sheep and wool. Calculations have been made on the basis that an ordinary 42in. pack takes up a space of approximately 2½ft. x 2½ft. x 4½ft. when filled. Thus, for example, by shortening the wool room, say, only 5ft. in the 4-stand shed the holding capacity will be reduced by approximately 15 bales and 50 sheep and the

At right—Sheep draw well toward light, provided here by the open door, which is blocked by a hurdle. Once the sheep are in the shed lowering the gates converts the wide alley into a series of suitable-size night pens.

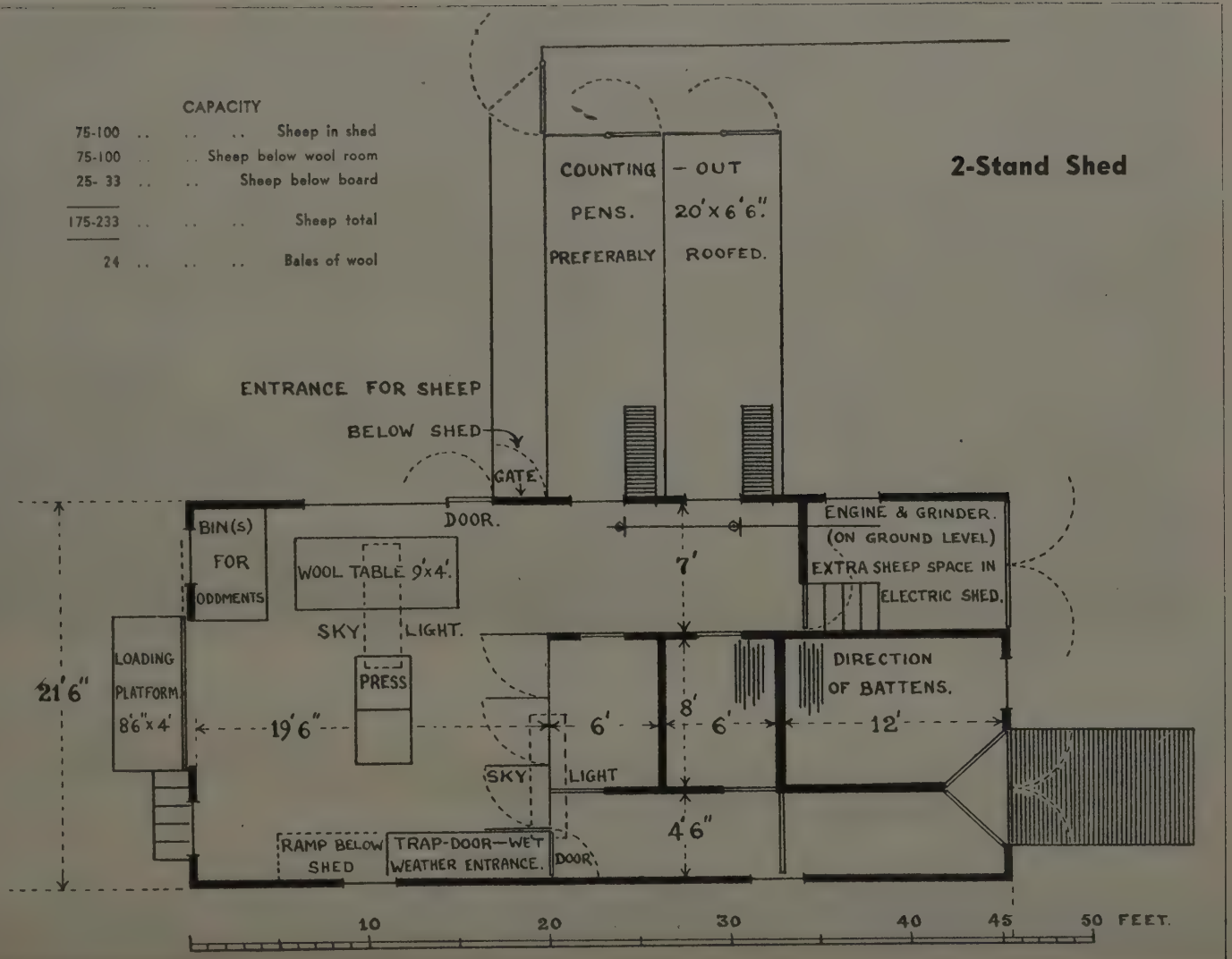
saving in expense will be comparatively small and probably will be regretted in the long run.

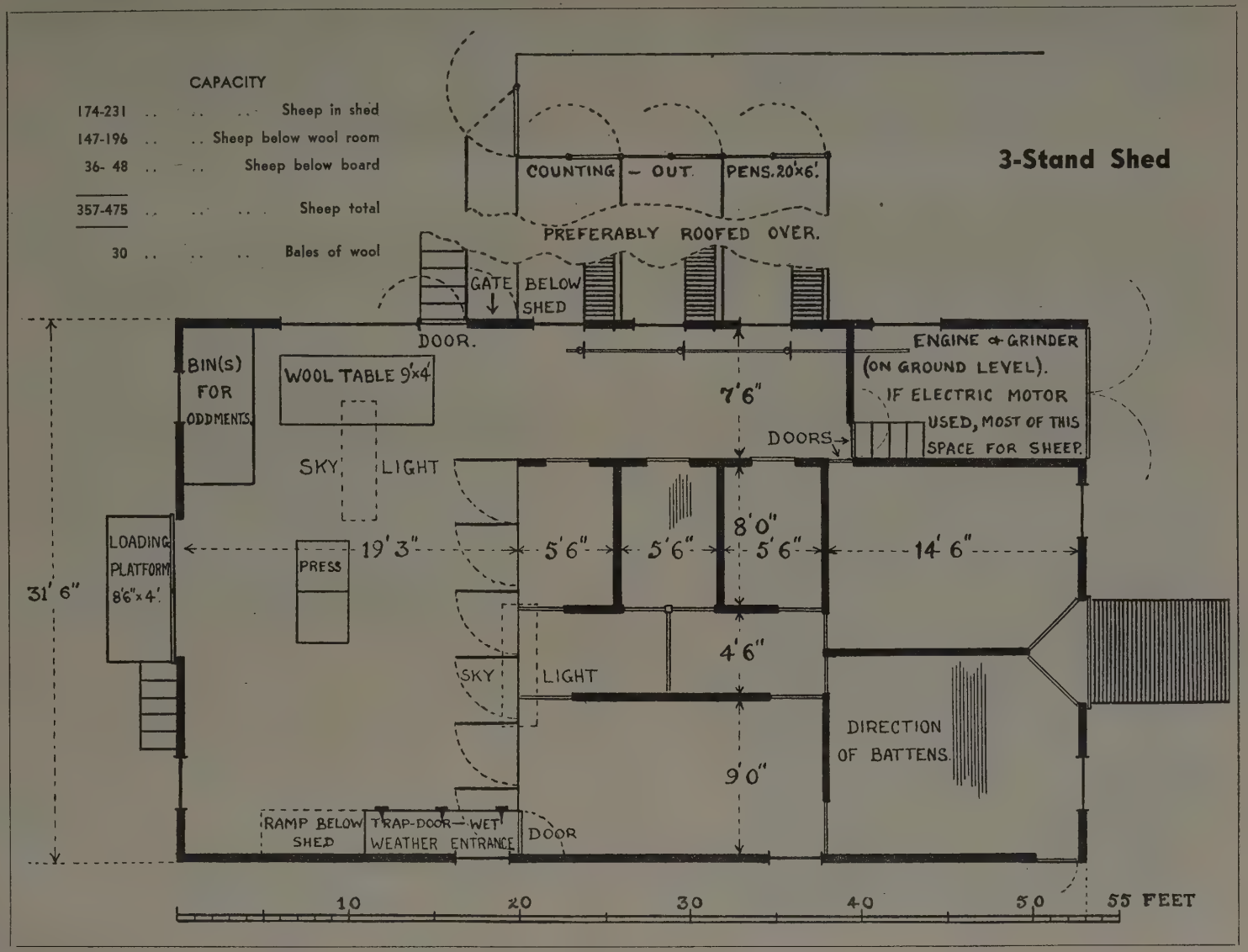
Type of Shed

The nearer the shed is to square the more economical will it be in building materials for a given floor area. Unfortunately, a square shape does not lend itself to the design of a wool shed, so the usual result is a compromise—a rectangular building for sheds of moderate size. For large sheds a T shape is common, with the shearing board in two sections and the wool room projecting as the stem of the T,

2-Stand Shed

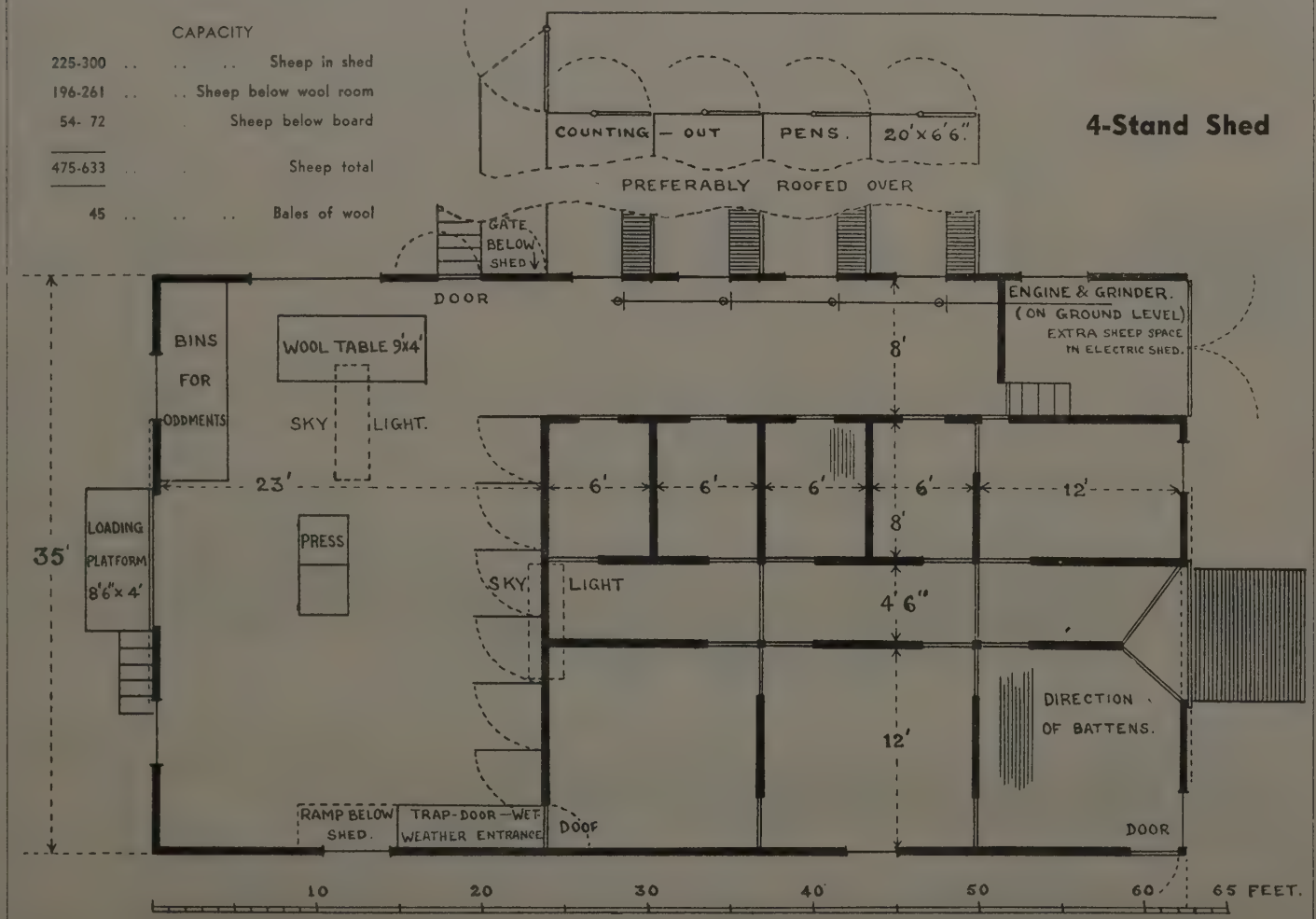
CAPACITY	
75-100	Sheep in shed
75-100	Sheep below wool room
25- 33	Sheep below board
175-233	Sheep total
24	Bales of wool




CAPACITY
174-231 .. .. .. Sheep in shed
147-196 .. .. Sheep below wool room
36- 48 .. .. Sheep below board
357-475 .. .. .. Sheep total
30 .. .. .. Bales of wool
3-Stand Shed
COUNTING – OUT
PENS. 20'x6'.
PREFERABLY ROOFED OVER.
GATE
BELOW SHED
DOOR.
BIN(S) FOR ODDMENTS.
WOOL TABLE 9'x4'
SKY LIGHT
ENGINE & GRINDER (ON GROUND LEVEL).
IF ELECTRIC MOTOR USED, MOST OF THIS SPACE FOR SHEEP.
7'6"
DOORS
LOADING PLATFORM 8'6"x4'
PRESS
19'3"
5'6"
5'6"
8'0"
5'6"
14'6"
31'6"
SKY LIGHT
4'6"
DIRECTION OF BATTENS.
9'0"
RAMP BELOW SHED
TRAP-DOOR – WET WEATHER ENTRANCE
DOOR
10
20
30
40
50
55 FEET

4-Stand Shed

CAPACITY	
225-300	Sheep in shed
196-261	Sheep below wool room
54- 72	Sheep below board
475-633	Sheep total
45	Bales of wool



Left—Ample head room below the floor of a shed. In addition to the gratings there is a foot-rot bath. Right—A wide and well-lighted ramp for transferring sheep from the basement to the shed.

but these will not be considered further.

Another type of building commonly found is the combination of wool shed and implement shed, with varying emphasis on the two functions. Generally a dual-purpose building of this sort shows a better return on capital invested, but usually suffers in efficiency by comparison with a straight-out wool shed.

Site

It is usually desirable to have the shed centrally located on the property, but in practice a suitable site for the shed generally depends on a number of other factors, such as situation in relation to already existing yards and/or dip, access roads, electricity supply, availability of shelter, water supply, drainage, and last but not least the lie of the land and prevailing winds.

Gratings provided for sheep held below the shed and the space allowed below these gratings for droppings are shown here. The gratings can be lifted out in sections.

The best site is the crest of a gentle rise which falls away more steeply to one side than the other. The yards should be on the more gentle side of the slope, with the drafting race up the slight slope toward the shed. The latter should be mounted on piles and should point away from the yards, with the wool room end highest from the ground. This arrangement allows one end of the shed to be almost on a level with the yards, and the other end is high enough to allow the easy loading of lorries from the wool room. At the same time it allows accommodation for sheep under the shed with a minimum of excavation and work.

There are two reasons for having the shearing board **facing** north-north-west where possible. First, this arrangement will give good lighting all day with sufficient light in the late afternoon and in winter at crutching time, when it is most wanted; secondly, the side of the shed with the counting-out pens will be most sheltered from cold, southerly winds.

Planning Internal Layout

When size and site have been settled details of the internal division must be decided. It may seem rather illogical

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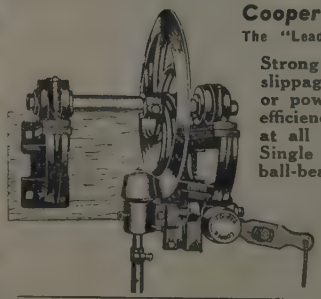

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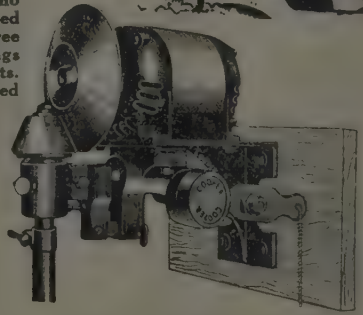

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Above—A well-appointed shearing board with excellent light and ventilation in the shed of Mr. L. E. Harris, "Brooklands", Wharerangi, Hawkes Bay. The catching pens have double swing doors. Below—Doors for the ports in this shed slide sideways.

to consider internal layout before the foundations and walls, but shape and dimensions of the various portions of the shed must be fixed before details of the exterior covering and support are finished. In the planning of the inside the following points should be taken into consideration:—

1. Whether all sheep are to be held on one level or if they are also to be held below parts of the floor. This has such an important bearing on dimensions and layout that it is considered again in detail later.

2. The "follow-through" principle, that is, that the sheep should be moving forward continuously until finally they reach the counting-out pens with as little side- or back-tracking as possible.

3. The sizes of the various pens should be multiples of one another, that is, the larger pens should hold twice, three times, four times, etc., as many sheep as the smaller ones, because this makes for convenience in filling and moving the sheep from pen to pen. The area toward the back of the pens should be well lighted, because sheep will always draw better toward a light. (Too much light coming up through the floor battens is undesirable; this will be dealt with later.)

4. Wherever possible gates should be arranged in the corners of the various pens for ease in transferring sheep from one pen to another.

5. The holding pens should not be made too large because of the danger of some sheep becoming smothered during the night. This can happen easily in a large pen if the sheep become frightened and crowd up to one end. To give a margin for safety pens should not be made larger than 200 sq. ft. (holding about 50 sheep), which means that a square pen will be about 14ft. each way.

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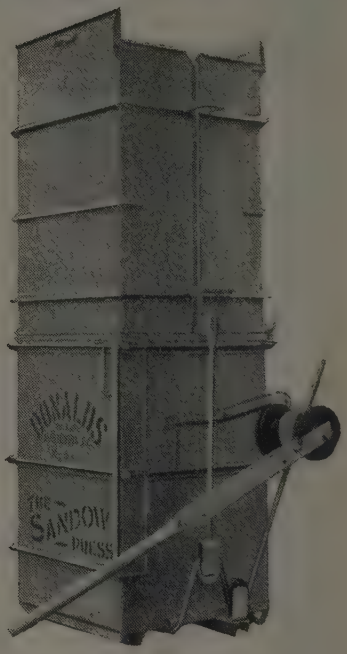

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6. A separate catching pen should be provided for each shearer, because sharing of catching pens is a fruitful source of arguments among shearers.

7. The shearing board should be neither too narrow, which causes crowding, nor too wide, which results in unnecessary walking and waste of time for the shearers. Between 7ft. and 8ft., according to the number of stands, is a good average width which works well.

8. The shearing board, wool table, and wool bins should be as close together as possible to eliminate unnecessary walking and delay and the wool room end of the shed should also be arranged on the follow-through principle.

9. Opinions vary as to whether a separate engine room is really necessary. With the old-fashioned oil engine it is certainly desirable to keep the noise and the dirt away from the shearing board, but an almost silent electric motor of small weight and bulk can be mounted in the rafters and more holding space for sheep made available. Some modern sheds with this arrangement or individual electric stands have neither grinder nor engine room, the grinder either being mounted at one end of the board or made movable so that it can be pushed out of the way when not in use.

10. The position of the counting-out pens depends on the arrangement of the shearing board and ports. In some sheds these pens are roofed over and protected from prevailing winds and thus serve as extra night-pen space at the minimum of extra cost. This arrangement is shown in the plans.

Above—Counter-balanced, lift-up doors for ports. Doors of this type exclude draughts as do doors that slide sideways. Below—In this shed heavy canvas curtains across the doors of the catching pens have been used very successfully.

Holding Sheep below Shed

Night-pen capacity can be increased at a minimum of extra cost simply by holding sheep below the solid portions of the floor, that is, under the wool room and shearing board. In a few sheds the owners have gone to the length of holding sheep on the full area of the ground floor, but this can be done only if a sloping false floor is provided below the normal night pens to catch urine and droppings that would otherwise fall on the sheep below. The method works well enough, but entails a good deal of extra trouble and expense.

Holding sheep below the shed means that the building is more efficiently used; the same roof suffices to cover it all and the only extra expense is likely to be for some excavation, longer piles, and the necessary subdivision into pens of the holding space. This works out much cheaper than adding the same extra night-pen space to a single-story shed, where both walls and roof would have to be enlarged. In fact there are few cases where it is not practical to hold sheep below the shed.

The usual practice where sheep are to be held below the shed regularly and not just as an emergency is to provide a proper batten floor with the gratings about a foot off the ground. They are made to lift up in sections to allow for cleaning out below them. If a grating floor is not provided, the ground will rapidly become very foul and slippery and consequently the

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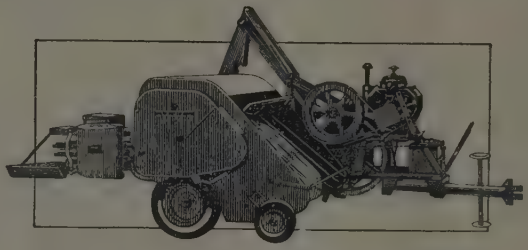

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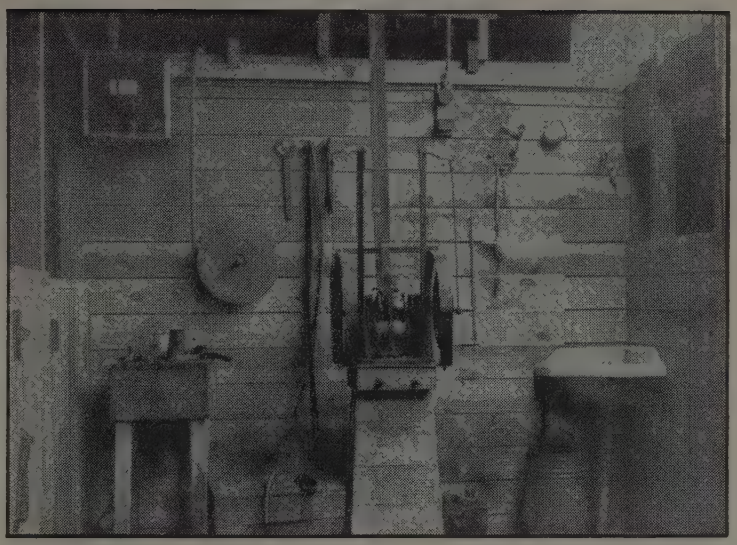
wool will get dirty. Sufficient height should be allowed for a man to move about without undue discomfort between the upper and lower sets of gratings. The aim should be to allow a minimum of 4ft. of head room here, or working sheep will be very awkward. Greater height is an advantage, but will mean higher piles and more need for a windbreak round the outside of the shed if it is not to be unduly draughty.

If there is insufficient room under the gratings of the top floor night pens for anyone to get in and clean out droppings, alternative provision must be made for doing this necessary job. Either the gratings in this part of the shed must be made to lift up in sections or one or more wide channels should be dug under this part of the shed to allow a man with a wheelbarrow to get below the floor and rake out the manure.

The night-pen space below the wool room is large enough to require some subdivision into pens, and these and their gates must be suitably arranged to communicate with the ramp leading up to the top floor. The positions of gates leading into the bottom storey are a matter for individual preference.



Grinder, tools, and wash-hand basin at one end of the shearing board.

Shearing Board

As the shearing board is one of the most important sections of the shed, it is essential that it should work efficiently. It is impractical to lay down a standard width for the board, as this will vary with the size and type of shed and is in any case a compromise between sufficient elbow room for everybody and too long a walk from shearing stand to catching pen for the shearers. With a 4-stand shed 8ft. is a good average width for the board, but with smaller sheds less is necessary—7ft. 6in. for a 3-stand shed and 7ft. for a 2-stand plant. It is unwise to go below 7ft., even in a single stand shed.

The length of the board will depend on the number of stands. With a shafting plant the minimum space between stands is 5ft. and the usual maximum is 6ft. If 6ft. is exceeded, extra brackets and bearings will be needed and these will add considerably to expense. With individual electric stands there is no such limitation, but they certainly should not be closer together than 5ft. A fault commonly found in old sheds is that the last stand is too close to the end wall, so that the man using it is cramped. To be on the safe side allow 3ft. 6in. from the last down-tube to the wall.

The relative positions of the catching-pen doors, the down-tubes of the machines, and the ports are important and must be correct (or very nearly so) if they are to work efficiently. The down-tubes should hang 4in. to the left of the edge of the ports. On the plans as they are printed (pages 186, 187, and 188) the right-hand edge of the catching-pen door should be approximately opposite the left-hand edge of the port. This layout makes for easy working and natural handling of the sheep. The doors of the catching pens should be at least 30in. wide and in the centre of the end of each pen. Ports for shorn sheep should be at least 21in. wide and 30in. high. Catching-pen doors can be the normal single type, small double doors which will swing both ways, or doors and heavy canvas curtains. With the last system the doors are closed and fastened during the night, but while shearing is in progress they are fastened right back out of the way and the curtains are brought into use. There are two full-length curtains which overlap slightly in the centre, and they are frequently weighted along the bottom edge with small pieces of lead to ensure that they hang straight. Those who have tried them claim that they are very successful and time saving and that sheep make no attempt to get out.

Some sort of door should always be provided for the ports to exclude draughts when there is a strong wind blowing. It should operate so that it can be left open when required without elaborate catches. Probably the most satisfactory type is a slide-up counter-balanced one, but this cannot always be used when there is a window directly above the port. A sliding door that moves sideways is satisfactory if it slides easily, but nothing is more exasperating to a shearer than a sliding door that sticks and wastes precious time and effort. Perhaps that is why so many farmers make do with a sack hung in the port. Swing doors tend to be a nuisance, because they need springs or cords, pulleys, and weights to keep them shut and catches to keep them open. Ordinary bolts and catches are too slow to work; they are therefore left undone, the doors swing in the wind, and the fasteners are soon broken.

Light on the shearing board, like that in the wool room, should be nothing short of the best possible. The orientation of the whole shed is governed to a large extent by this requirement. Ways of achieving it will be considered later.

Other details that should be considered before building begins are:—

The floor of the board should not be of hardwood, such as heart matai, or it will become dangerously slippery. Softer and more absorbent timbers are safer, even if not as durable.

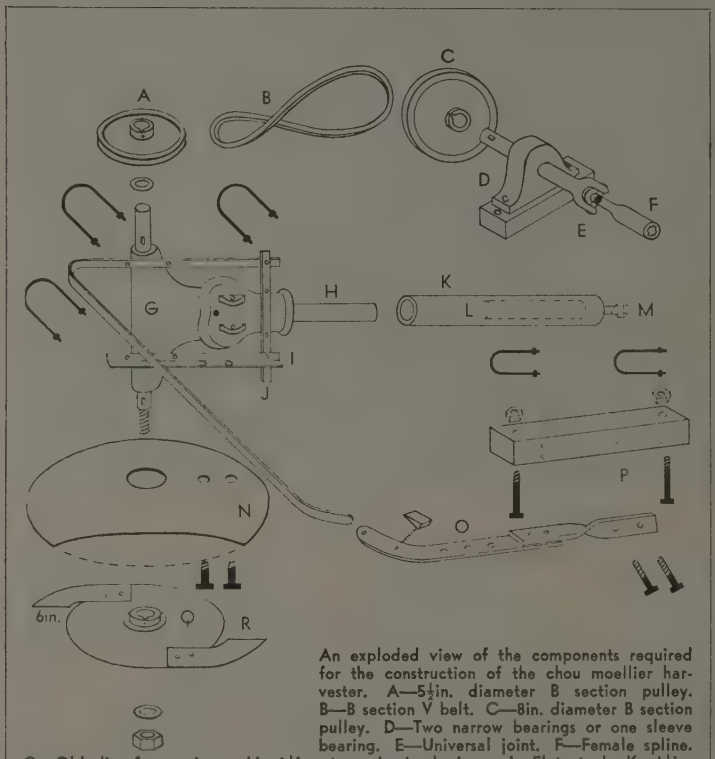
The usual 4in. x 2in. bottom wall plate will project about an inch above floor level and thus form a ledge across the bottom of the port. This is all to the good, as it helps to prevent wool from being dragged out into the counting-out pens, but some farmers prefer to increase this projection by nailing an additional ½in. to 1in. thickness of board on top of the wall plate, care being taken of course to chamfer off the corners.

Each shearer should have a shelf for his gear and the usual water pot, though some farmers think it worth while to provide each shearer with a proper small cupboard for this equipment.

An Inexpensive Chou Moellier Harvester

By C. J. CROSBIE, Machinery Instructor, Department of Agriculture, Christchurch

FARMERS who have cut chou moellier by hand in winter for feeding to stock will know the time this work takes and the discomfort caused by rain, hail, or snow shaking off the leaves when the stems are cut. Such farmers will appreciate the 92 per cent. reduction in cutting time and the elimination of the moisture hazard that come with the use of the chou moellier harvester described here, a machine designd and built for approximately £5 from old implement parts by Mr. F. Farquhar of Belfast, Canterbury.



An exploded view of the components required for the construction of the chou moellier harvester. A—5½in. diameter B section pulley. B—B section V belt. C—8in. diameter B section pulley. D—Two narrow bearings or one sleeve bearing. E—Universal joint. F—Female spline. G—Old disc forecarriage. H—1½in. stem. I—Angle iron. J—Flat steel. K—1½in. galvanised pipe. L—Distance piece. M—Adjusting bolt. N—Old disc plough blade cut back from original shape shown by dotted line. O—Gooseneck. P—Hardwood block. Q—Old plough skeith approximately 12in. in diameter. R—Chaffcutter blade. In addition the U bolts, nuts, bolts, and washers shown are necessary.

A TRAILER load of chou moellier sufficient for 40 cows on winter milk supply and which formerly took 1 hour to cut by hand can now be cut by the tractor-mounted harvester in 5 minutes. This time includes that required to fit and dismantle the machine. The whole operation of cutting, loading, and feeding out, which formerly took 2½ hours, can now be accomplished in 1 hour.

The crop is sown in 28in. rows at 2lb. of seed per acre, which ensures that the resulting crop is upright and contains no giant stems, which could be difficult to cut. The crop is weeded by inter-row cultivation until it is too high to pass under the cultivator and is smothering the weeds between the rows. The crop is then weed free and grows evenly, so that it is ideal for mechanised harvesting.

The harvester is essentially a pair of horizontally revolving blades mounted on the rear and to one side of the tractor and powered by the tractor's power take-off. As the tractor moves up the row the chou moellier stems are cut cleanly just above the ground so that the heads fall backward to lie neatly in a row for later picking up and loading on to the trailer.

The cutting blades and their shaft were mounted in what was the horizontal axleway of an old forecarriage of a set of discs. The forecarriage had been turned through 90 degrees so that its 1¼in. diameter stem lay horizontally and fitted into a piece of 1½in. galvanised piping. This piping was fitted by U bolts to a piece of hardwood bolted to the tractor's drawbar so that it did not interfere with the drawbar. To the left-hand end of the piece of 1½in. piping a plate which had been drilled and tapped to mount an adjusting screw was welded. This screw exerts pressure through a distance piece of suitable length to the cutting head, enabling it to be tightened into the V belt which drives it

Chou moellier which has been cut by the harvester being fed out.

CHOU MOELLIER HARVESTER

Two old chaffcutter blades were bolted to an old plough skeith as shown in the diagram and the skeith centre was turned out to fit the vertical shaft. A keyway was cut in the skeith centre and a corresponding one was cut in the lower end of the shaft, which was also turned and threaded to take a washer and nut. This completed the mounting of the blades on the shaft. A washer and a 5½in. diameter B section pulley which was keyed and grub-screwed to the top of the vertical shaft completed the mounting of the shaft in the forecarriage axleway; a grease nipple in a suitably tapped hole provides for lubrication of the bearing.

The axleway casting of the forecarriage, which was pivotally mounted on its vertical stem, was made rigid by mounting with U bolts a section of angle iron and two steel straps as shown in the diagram; the top longer steel strap was bent round and carried forward to approximately the centre of the tractor's rear wheel so that it forms a fender which gathers up and guides leaning stems on to the cutting blades.

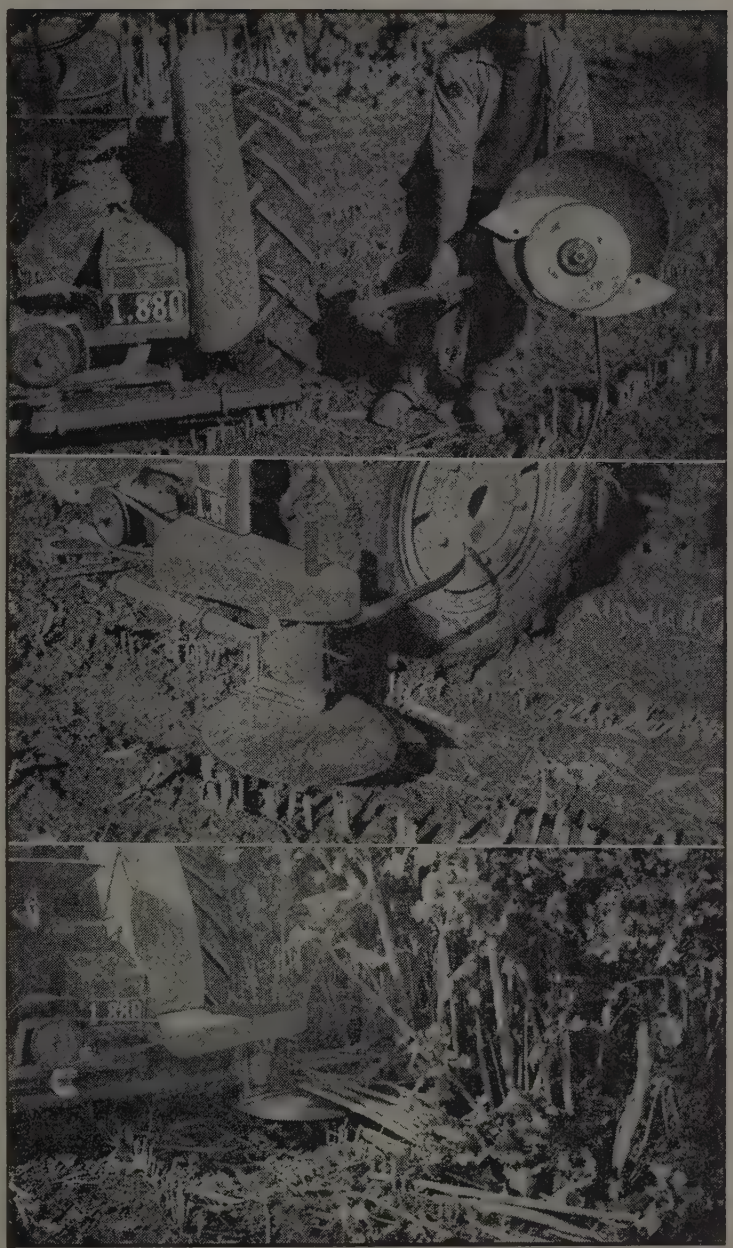
The whole forecarriage and cutting head was prevented from rotating in its pipe mounting by the original goose neck being bolted to a steel strap mounted under the drawbar and by the outer end of the goose neck being wedged between the two flanges provided for it on the forecarriage.

If this goose neck is carefully mounted, the cutting head can be fixed in such a position that the leading edges of the knives have a slight dip down and the trailing edges clear the already cut stems in the ground.

An old blade from a disc plough shaped as shown in the diagram and with two bolt holes blown in it with a cutting torch was fitted above the cutting blades and bolted to the lower angle iron so that it provides a shield over the blades yet allows their tips to emerge and cut stems in the path of the harvester. As the stems fall back over this shield, they are not damaged by the revolving blades and fall neatly into a windrow.

A suitable length of female spline, a universal joint, a short shaft carried in a bearing mounted above the drawbar, an 8in. diameter B section pulley, and a B section V belt provide the power line from the tractor's power take-off shaft to the cutting head.

This chou moellier harvester will be found simple to build from scrap material with the aid of the local mechanic and is cheap to construct. It will do much to take the back-breaking toil out of hand cutting, and will find its uses in other crops too; for example, for cutting green maize for feeding out to stock.



Upper—A view of the cutting head of the chou moellier harvester showing the chaffcutter blades fitted to the plough skeith and protected by the shield made from a discarded disc plough blade. Middle—A general view of the harvester mounted on the rear and to one side of the tractor and powered from the power take-off shaft. Lower—The harvester leaves the cut stems in a neat windrow ready for picking up and loading on to the trailer. The harvester can cut sufficient chou moellier for 40 cows in 5 minutes.

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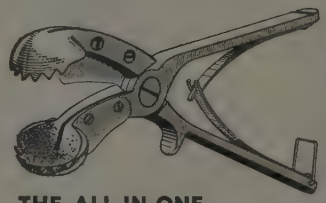

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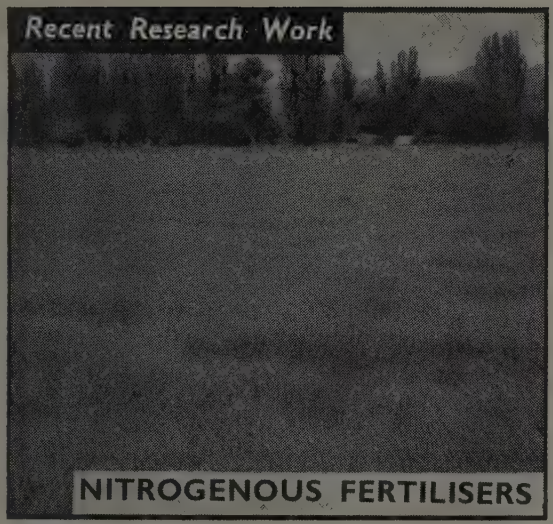

NITROGENOUS FERTILISERS

NEW ZEALAND farmers use very little fertiliser nitrogen to promote pasture growth and generally rely on clovers to supply this element. Nitrogenous fertilisers may, however, on occasion be used to advantage to increase early spring grass production, and the results of trials on their use which were carried out in the Auckland Province are given in this article.

TRIALS IN 1928-30

IN the years 1928 to 1930 about 150 trials which were conducted on a paddock scale and which used milking cows and dry dairy stock as the measuring stick showed that quick-acting nitrogenous fertilisers can lead to appreciable increases of pasture growth if applied to ryegrass-dominant pastures under favourable weather conditions. For the milder districts of the North Island the best time to apply nitrogen was generally found to be July. Later a limited number of trials showed that using nitrogenous fertilisers to increase the yield of fields shut up for hay had little value.

Apparently, therefore, in late winter and very early spring pastures on well-drained soils in the warmer districts of the North Island are limited in their growth by the lack of nitrogen from natural sources. On soils lying wet in winter and early spring, however, the lack of aeration of the soil slows down pasture growth, and the application of quick-acting nitrogenous fertilisers at this time may bring little or no improvement.

As the soil warms up in spring the nitrogen production by the bacteria associated with clovers and by other sources soon seems to become considerable, making treatment with mineral nitrogenous fertilisers less worth while and less effective in accelerating pasture growth. These early trials also showed that nitrogenous fertilisers on an average increased production much more on pasture containing plenty of ryegrass than on pastures containing little of this species.

RECENT TRIALS

As pastures would have improved considerably since 1928 it was thought well worth while to review the merits of nitrogenous fertilisers. Sixteen trials using sulphate of ammonia and ammonium nitrate stabilised with various proportions of lime were conducted in Auckland, Hamilton, and Rotorua districts. The fertilisers were sown in June, July, or August in strips, often replicated, on fairly good or good pastures. The strips were not grazed at all or were grazed only for a short time and then shut up for 21 to 90 days. The pasture was cut and weighed and in many cases the dry matter content of the herbage was determined. The yield data showed that the application of sulphate of ammonia or ammonium nitrate mixtures at 1cwt. per acre resulted in an average increase of 25cwt. of green herbage or about 450lb. of dry matter per acre. (Increases in green weight per acre ranged from 0 to 59cwt.; 450lb. of dry matter from young grass would keep 18 cows in full production for 1 day.)

In the second year of the earlier trials carried out in 1928-30 the increase in butterfat for each hundredweight of sulphate of ammonia applied was 18lb. This increase is approximately the same as that calculated from present-day trials. However, the length of the additional young grass produced by quick-acting nitrogenous fertilisers can be increased considerably if it is fed off with a low-protein supplement such as hay. Extra grass growth in early spring is more valuable than similar production during the main growing season. It not only provides feed when feed is scarce, but it makes a valuable protein-rich supplement for hay or silage leading to better utilisation by the animal of these two forms of saved grass, particularly if they are of only fair quality, as they so often are.

To secure the best results from nitrogenous fertilisers in winter, pasture management should be worked to a definite plan. As much as possible of a dairy farm should be closed for late winter and early spring feeding by shutting up fields from mid-April onward. The use of nitrogenous fertilisers, however, on fields closed in this period is not warranted, except perhaps on town supply farms.

On butterfat supply farms when the cows are dried off they should be concentrated on two or three fields. Each field should be fed off in turn and the cows should be fed a supplement such as hay or silage. This permits the remainder of the farm besides the early closed fields to grow winter grass. The first cows to calve are grazed in the fields shut up in autumn. At the same time production from the fields closed in late winter can normally be increased by the application of quick-acting nitrogenous fertilisers provided these fields contain much perennial ryegrass or, even better, short-rotation ryegrass. Best results are obtained if the nitrogen is used when there is already a short growth of pasture on the fields and where phosphate has been applied in autumn. Showery, mild weather after application is most suitable for obtaining really good responses, but prolonged rain after nitrogen topdressing may leach out much of the soluble nitrogenous fertiliser; dry, frosty weather, on the other hand, will prevent pasture from making much growth, in spite of the addition of nitrogenous fertilisers.

RATE OF APPLICATION

In some of these 16 trials nitrogenous fertilisers were also applied at 2cwt. per acre. Though the trials were too few to make it possible to form an accurate estimate of the value of the second 1cwt. of fertiliser, it seems that a larger increase in pasture production can be expected from a given quantity of nitrogenous fertiliser if it is applied at 1cwt. per acre than if it is applied at 2cwt. per acre.

Clover growth was only slightly depressed by the use of 1cwt. or 2cwt. per acre of nitrogenous fertilisers. It seems that the application of small amounts of nitrogen to pastures does not result in subsequent slumping of pasture production provided the nutrient status of the field and the soil reaction are satisfactory and the aggressive type of New Zealand white clover is present.

Both types of material tested, namely the sulphate of ammonia and the ammonium nitrate plus lime mixtures, gave the same average response.

Reference

A. W. Hudson and J. W. Woodcock, "Nitrogen Dressing of Dairy Pastures", "New Zealand Journal of Agriculture", vol. 42, p. 99, 1931.

—C. DURING

HEADING PHOTOGRAPH: Ryegrass seed crop sown after peas, showing beneficial effect of applying nitrogen.

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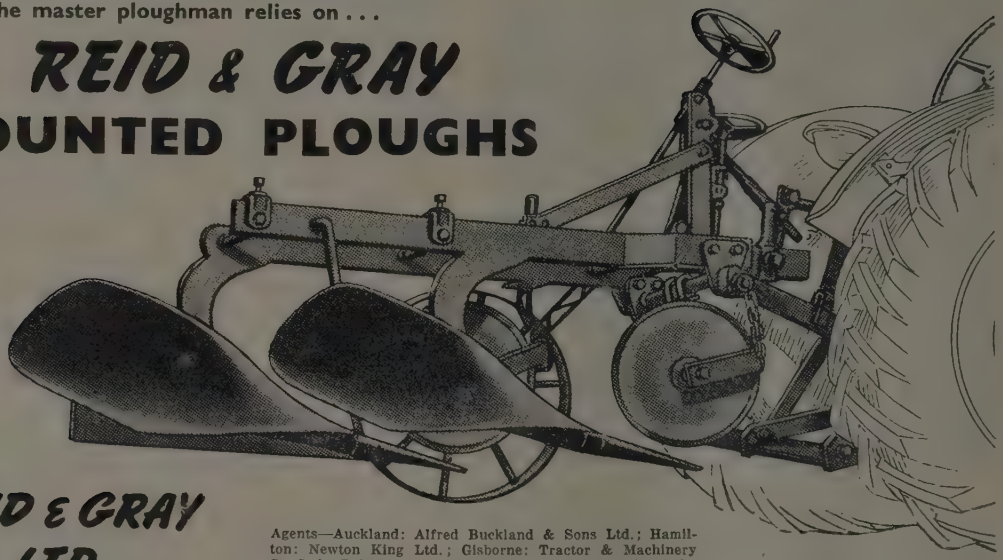

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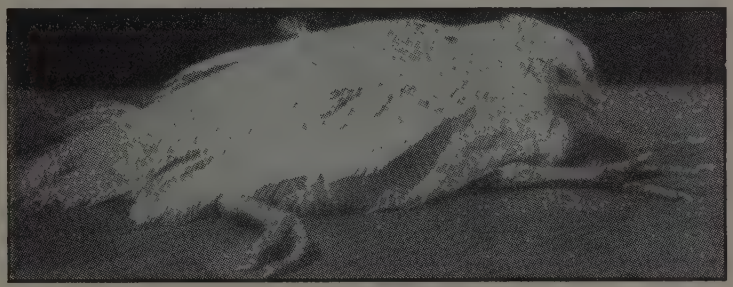
Disease in the Household Poultry Flock

By M. E. WHITE, Poultry Instructor, Department of Agriculture, Levin

DISEASE in the small household flock can be a source of worry to the owner. High cost of feed and replacements have, of necessity, brought about a change in the outlook toward backyard poultry keeping compared to the hitherto rather careless attitude. The householder or farmer who keeps a dozen or so fowls to provide eggs for use in the home will be anxious to learn what diseases may be likely to affect birds and so interfere with egg production and he will also want to know something of the causes of such diseases and how these may be controlled. As an aid to this knowledge a brief description is given in this article of the various diseases commonly found in small flocks, their symptoms, and control methods.



Above and below—Typical external symptoms of advanced fowl paralysis where the nerves in the legs are affected.

THE diseases most commonly present may be divided into two classes:—

1. Those in which treatment is of no value or is uneconomic; and
2. Those which may be treated or controlled by management.

Birds affected with the first class of these diseases are usually disposed of as soon as possible, either because it is useless to attempt treatment or because they will not return to egg production in a reasonable time. The second class of diseases has much less severe effects and most of them can be corrected.

Left—A diseased liver, a symptom of fowl paralysis of the type usually referred to as "big liver disease". A normal liver is shown at right.

Many of the diseases which lead to loss or poor production are preventable. The main factors causing such conditions usually arise from neglect of good management and hygiene, or poor type of feed.

Fowl Paralysis

Fowl paralysis, an infectious disease, is the most common cause of loss not only in household flocks but throughout the poultry industry of almost every country in the world. It may affect the bird in a number of ways and it is now recognised that though the symptoms do not show up until the bird is 3 to 9 months old, the infection is contracted during the first few weeks of life.

True fowl paralysis affects the nerves, and the symptoms depend on the site of the nerve injury; for example, there may be lameness in one leg, with the toes turned inward in a clutching position, drooping of the wing, or twisting of the head and neck.

The visceral form of fowl paralysis, sometimes called "big liver disease", may cause several symptoms, depending on which organs are affected. Egg production drops or ceases and loss of

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condition is fairly rapid. The comb and wattles become pale and diarrhoea may be evident.

The condition is usually easy to recognise if the disease takes the usual form of paralysis of the leg or wing, particularly when the bird is 3 to 6 months old. No treatment is of any value, but if the affected bird is in good condition and is killed at an early stage, it may be used as a table bird.

Coccidiosis

Coccidiosis is a parasitic disease. It takes two main forms one of which affects young birds from 10 days to 6 weeks of age and the other of which is usually found in older birds.

Caecal coccidiosis, as the first type is known, initially gives chicks a dejected appearance. Feathers appear ruffled and drooping, heads are pale, and legs may possibly be weak. An important symptom is blood in the droppings. Losses may be heavy unless treatment is applied promptly.

This type of the disease occurs where there is overcrowding and poor, damp litter caused by insufficient ventilation or the spilling of water from drinking vessels. Chilling and inadequate diet may also be responsible in some cases.

Treatment

Provided each is used at an early stage, sulphaquinoxaline or sulphamethazine will bring about a rapid cure if given in the doses recommended by the manufacturers.

Duodenal coccidiosis, as the second type is known, is usually chronic. It may cause few deaths, but can give rise to a chronic wasting illness and heavy loss of egg production. The comb and wattles of affected birds are pale and shrunken and the bird has an unthrifty appearance.

Sulpha drugs are of value in the early stages, but if the disease has been allowed to go too far, the birds are usually not worth treating.

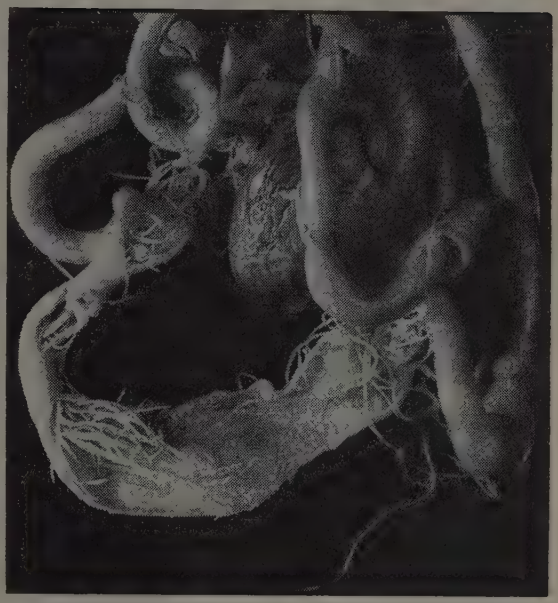
The Large Roundworm

Large roundworms are often present in small numbers in birds without causing any ill effects. When present in large numbers, however, they may do considerable harm and cause loss of condition and lowered egg production. The White Leghorn is probably more susceptible to the effects of the large roundworm than the heavier breeds. Age also plays a part and as the birds become older they are more resistant to roundworms and deworming is seldom required in birds over a year old. It must be emphasised, however, that though the older birds are not affected, they may be a source of danger to the younger birds by grossly contaminating the run.

Chicks or perching pullets must be reared on fresh ground which has not been used by adult stock for at least 6 months. Provided the grass is kept short over summer, the ground will become safe for young birds. In small runs the complete removal of the topsoil may make it usable.

Treatment

Carbon tetrachloride is the drug which has shown the best results in de-worming. It may be obtained in small gelatine capsules which are easily administered, and as a routine measure of protection pullets should be given a 1 c.c. capsule at the age of 3 months. The birds should be starved for 18 to 24 hours before they are dosed to ensure sufficient de-worming. A feed may then be given immediately after dosing is completed.



The intestine of a fowl cut open to show a heavy infestation of roundworms.

Avian Tuberculosis

Avian tuberculosis is frequently referred to by poultry keepers as "going light" because of the loss of condition and weight and the pale colour of the comb and wattles. It occurs mainly in second- or third-season birds, but is met with occasionally in laying pullets. The loss of weight eventually leads to emaciation and may be accompanied by other symptoms such as diarrhoea, lameness, and general weakness. Despite these symptoms the birds frequently maintain a good appetite. Where this disease is suspected ailing birds should be sent to the Department's Animal Research Station, Wallaceville, for post-mortem examination.

If tuberculosis is confirmed advice regarding the eradication of this disease will be supplied.

Further information on these and other diseases is given in bulletins obtainable at offices of the Department of Agriculture or it can be obtained from the local Poultry Instructor.

Book Review

"Easier Shearing": Ern. Barnes

BORN and bred on his father's sheep farm in Victoria and determined to become a good shearer, the author describes vividly his experiences as a learner shearer in his first shed. This was on "Urangaline" Station in the Riverina, New South Wales, where 75 shearers shore approximately 200,000 sheep that season, shearing about 8000 a day in one of the largest wool sheds in the world.

He describes being landed with the "cobblers" by his three more experienced mates who caught out of the same catching pen and the satisfaction he experienced when he shore over 50 sheep in a day and then over 100 by applying the rule "eliminate useless motions and speed up the useful ones". The orthodox method of shearing Merino sheep is described.

The book is illustrated by photographs of good shearers in action. Unfortunately some of these photographs have not reproduced as well as could be expected.

The author touches on the health of the shearer and gives some hints on the maintenance of shearing machinery. He points out why he considers it impossible to compare shearing records in different countries on an even basis and suggests that a shearer's worth should be assessed on the number of sheep he has shorn in one season and on the average number of sheep he has shorn per season over a number of years.

—*G.L.W.*

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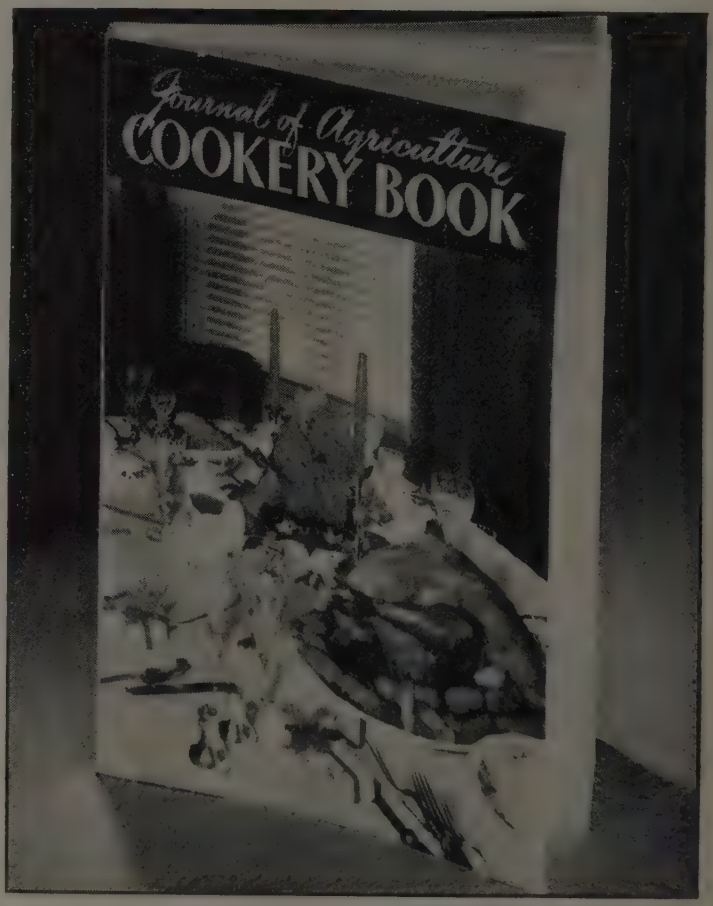
BOOK REVIEW:

"'Journal of Agriculture' Cookery Book"

MANY readers of the women's section of "The New Zealand Journal of Agriculture" at times must have cut out recipes from it, meaning to glue them into recipe books. Very often these good intentions remain unfulfilled and the printed pages, hastily tucked into a kitchen drawer or an old cookery book, become dog-eared and torn or are lost. For those readers and for the many housewives who prefer to have a comprehensive range of New Zealand recipes in compact form the "'Journal of Agriculture' Cookery Book", recently published by A. H. and A. W. Reed, Wellington, will fill a long-felt need.



IN this book are hundreds of the "Journal" recipes that have proved popular in recent years. The subject matter is arranged in chapters and it is clearly indexed. A special feature of the book is the introductory chapter, "Food Planning for Health", which discusses the basic principles of diet and good health. The New Zealand Department of Health's daily dietary plan is the standard used and it is explained simply and clearly. The meal-planning section at the end of the chapter, which includes some helpful "do's" and "don'ts", is illustrated with typical New Zealand menus.

Preparation of Food

At the beginning of each of the following chapters there is an explanation of the best way of handling the food discussed; in some of these preambles general rules for preparation are given and in others tables of cooking times and methods. For example, the vegetable chapter has several pages of introduction which describe the choice of vegetables either from the home garden or from the shop. Storage, preparation, and cooking methods are all discussed in detail, and a very useful table sets out the most suitable method and the times required for cooking the most common New Zealand vegetables. Pressure cooking is also dealt with and the recipes include some appetising casseroles and savoury dishes.

Directions for Carving Meat

The man of the family will be interested in the illustrations and directions for carving meat and poultry. The housewife who buys her meat from the butcher may find much useful information in the section on cuts of meat and the standards laid down by the New Zealand Standards Institute and which enable the consumer to buy the meat best suited to the purpose for which it is intended. Grade markings are listed, so that there should be no excuse for buying stewing steak instead of grilling steak.

Other chapters deal fully with such subjects as meat cuts and cookery, salads and salad dressings, cakes and biscuits, and desserts.

Stress is put on planning meals that are not only wholesome, but which will appeal to the family's eyes as well as to its palate.

The "'Journal of Agriculture' Cookery Book" contains 208 pages, is attractively illustrated, and is arranged to give easy reference to its 624 recipes. It can be recommended to the New Zealand housewife as a valuable kitchen aid.

—B.M.J.

Price of Book

COPIES of the "'Journal of Agriculture' Cookery Book" are available from main offices of the Department of Agriculture for 5s. 9d. each, post free, and from booksellers.

Springtime is Egg Time

By EVELYN E. MOORE, Field Officer in Rural Sociology, Department of Agriculture, Palmerston North

[*Niederer*

DOUBTLESS the majority of farm housewives who keep a small flock of hens to supply their eggs find they have a surplus during spring and early summer, when egg production is at its peak. Though it is unlikely that the disposal of this surplus is ever a problem to them, it is suggested that if cost of production and low spring prices for eggs are taken into account, it is probably more economical to store or use as many as possible of the surplus eggs than to sell them and perhaps have to buy eggs when they are scarce and expensive. The following article therefore describes briefly the preservation and storage of eggs (the method was described fully in "The New Zealand Journal of Agriculture" of September 1953) and discusses some aspects of successful egg cookery, including points in the use of preserved eggs.

IN addition the importance of not skimping the family's supply of eggs (one of the most nutritious foods) is stressed. As eggs are freely available at a time when vegetables and fruits are apt to be scarce and expensive, a variety of recipes for using eggs, either to brighten a rather uninteresting menu or for special occasions, is included.

Preservation and Storage

The first essential for successful preservation of eggs is that they must be fresh; that is, preserved on the day they are laid, if possible. Even so care is required in the selection of the eggs if preserved eggs are to be of good quality. Clean-shelled eggs only should be chosen—not washed or cleaned ones—and they should be cooled thoroughly before preserving.

The shells should be sound, firm, and smooth and the eggs free from blood spots and infertile. Candling is an excellent way of judging these qualities. This may be done without special equipment by cutting a hole the size of an egg in a piece of cardboard and holding this in front of a bright light so that the light shines through the hole on to the egg. Black specks (indicating blood spots) and fine cracks will show quite plainly.

Methods of Preserving

Perhaps the oldest and most popular method of preserving eggs is by the use of a waterglass solution. If instructions given with the waterglass preparation are followed carefully and the eggs are kept covered and stored in a cool place, success should be assured.

An alternative method is the use of a substance similar to petroleum jelly which is smeared carefully over the surface of the egg shells, the eggs being packed small end down in an open container. Storage in a cool place where there is a minimum change of temperature is more important with eggs treated by this alternative method, as they are more readily affected by temperature changes than those preserved in waterglass solution. Eggs preserved by the coating method should not be stored near kerosene or other strong-smelling liquids or strong-smelling foods.

Cool Storage

Cool storage of eggs, which is now practised to a large extent commercially, may be carried out in a more limited way by the housewife who possesses a refrigerator, as clean, new-laid eggs will keep well in one for a month or more. Even if a refrigerator is not available, eggs should be stored in as cool a place as possible, particularly during hot weather in summer. Eggs pick up strong odours very quickly, so they should not be stored even for 2 or 3 days near strong-smelling substances such as kerosene if tainted eggs are to be avoided.

The advent of the home freezer has also made possible another method of storing eggs which is particularly suitable for cracked, dirty, or undersized eggs. A suggested method is as follows:—

Wash the eggs. Separate the yolks and whites. Add 1 teaspoon of salt or 1 tablespoon of sugar to each pint of yolks and stir them gently. The sugar or salt prevents the yolks from becoming watery and ropy on thawing. Pour the yolks into freezing containers, seal, and freeze.

Add nothing to the egg whites. Stir them gently and strain them through a wire strainer to remove white blobs. Pour them into containers, seal, and freeze. Egg whites and yolks, like

other frozen foods, should be used immediately after being thawed.

Whole eggs may be beaten slightly until mixed but not frothy, sugar or salt added in the same proportion as for yolks, and the eggs frozen.

Nutritive Value of Eggs

That eggs are a food which can play a useful and valuable part in providing the nutrients essential for health is probably one of the best-known facts about nutrition and there are many people prepared to make considerable sacrifices to ensure that their children have sufficient eggs. This should not be forgotten by those who are tempted to sell as many of their home-produced eggs as possible for the pocket money they bring in and thereby perhaps to skimp their family's supply of this nutritious food.

An egg will make an important contribution toward the body's daily requirement of high-quality protein, iron, and vitamins, and compares more than favourably with meat and other classes of food as a source of a variety of nutrients essential for health (see the illustration on this page and the opposite page.

The colour of the egg shell is sometimes said to have a bearing on the nutritive value of the egg. This is quite wrong, the colour of the shell being merely a characteristic of the various breeds of poultry. The diet of fowls, however, does affect yolk colour. Where birds are receiving plenty of greenfeed eggs have good yolk colour. Where no greenfeed is given egg yolks are likely to be pale and unattractive, but the nutritional value of the egg is unaffected. Most poultry farmers feed a fish oil or vitamin concentrate in their mashes, which ensures an adequate vitamin A content in the eggs laid by their birds.

Egg Cookery

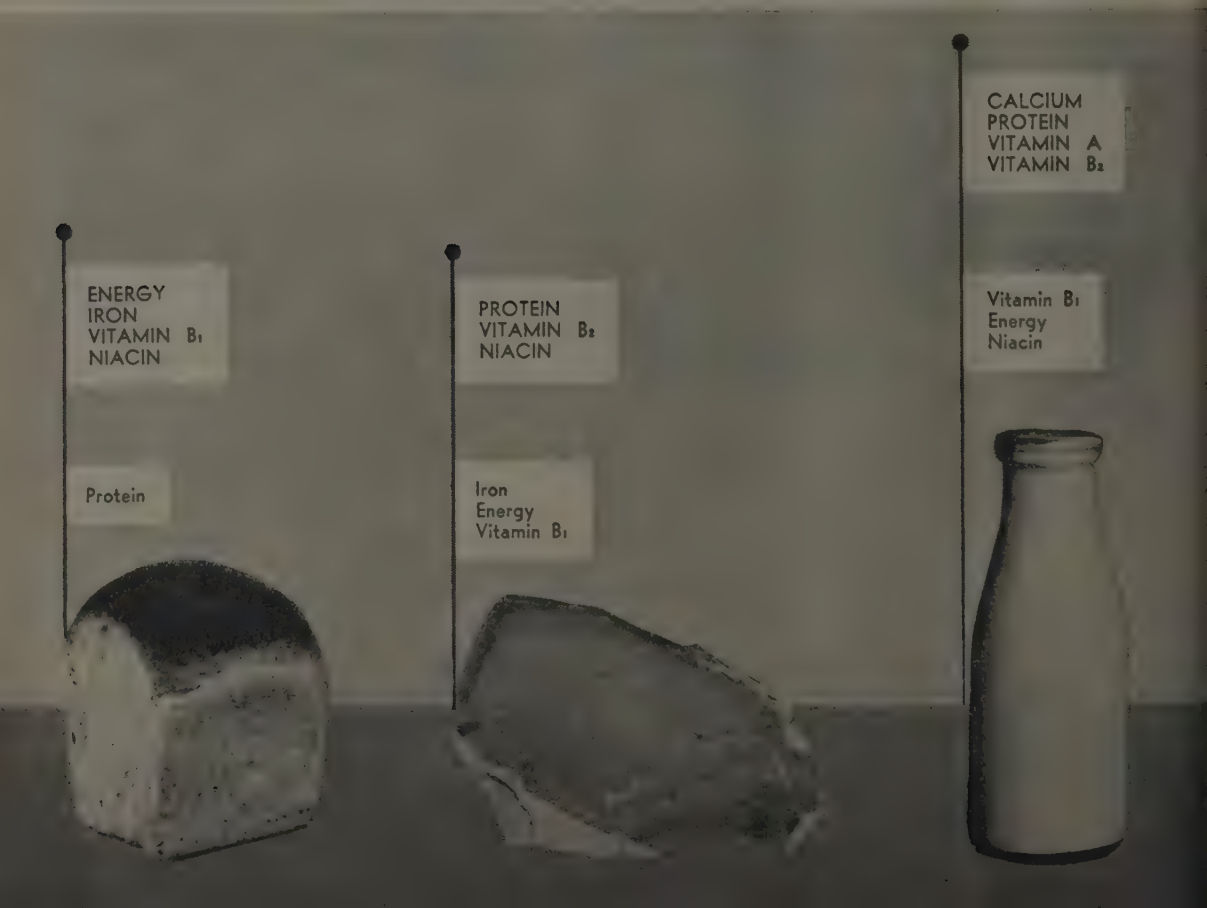
The tender, fluffy omelet or the mouth-watering sponge cake are often regarded as the hallmark of the good cook. Yet there is nothing to prevent any housewife who takes sufficient care from achieving such success, as it is mainly a matter of a knowledge of the various factors involved in successful egg cookery and of the limitations of preserved eggs in comparison with fresh ones.

Preserved eggs can be used successfully in a great many egg dishes and provided they are of a high quality and showing no signs of staleness, can even be used with success in such dishes as pavlova cakes and meringues.

Limitations

Both eggs which have become rather stale and preserved eggs have certain limitations in cookery. The older the egg becomes, especially if it has been preserved for some months, the more difficult it is to separate white and yolk. Water passes into the yolk, stretching the membrane surrounding it and thus causing the membrane to break very easily.

In the illustration below on this page and the opposite page the nutritive value of eggs is compared with that of other foods with which they are commonly classed, especially meat, a typical cereal food (bread), and a common vegetable (cabbage). Only calcium, iron, energy, protein, vitamins A and C, and the vitamins of the B group most likely to be lacking—B_1, B_2, and niacin—are included because of the relative abundance of other nutrients in foods. Large type on the label indicates that the food is a good source, small type that it is a fair source; if a nutrient does not appear on the label, the food is a poor or negligible source or has not been tested.



As eggs age the whites also become thinner and more watery, which makes successful poaching or frying of the eggs difficult. In poaching, however, the addition of ¾ teaspoon of salt and 2 teaspoons of vinegar to each pint of water will make the whites set more firmly.

The whites of old preserved eggs, though they may whip up quite rapidly, are easily overbeaten and do not become as stiff as fresh whites; nor do they have the elasticity of fresh whites, so that it is better not to use them in such foods as meringues and souffles. Meringues are very apt to become sticky, and souffles are more apt to fall if old preserved eggs are used. Such eggs can be used in sponge cakes, but the cakes tend to have a coarser texture and may have less volume. As in poaching the addition of a small amount of salt or acid helps to counteract this tendency.

Preserved eggs may be coddled or hard cooked, but should be pricked to prevent them from bursting. Though the preparation of hard-cooked eggs is generally regarded as more or less fool-proof, they are not always a success. The development of a greenish black line in a hard-cooked egg between the yolk and white is occasionally taken as an indication that the egg is bad, but it is caused by overlong boiling, as the line starts to develop after 15 minutes' boiling.

Hard-cooked eggs are also sometimes difficult to shell, but a frequent cause, whatever the method of cookery, is the use of too fresh eggs. Eggs that are a few days old will generally peel much more readily than newly laid ones.

Achieving Uniform Results

In the more difficult forms of egg cookery the proportions of ingredients used, ways of combining them, and the cooking temperature can also have an important effect on the results obtained. This is particularly so with souffles, meringues, pavlova cake, and American angel cake. For the cook who has had some difficulty in obtaining uniform success with these recipes some suggestions follow.

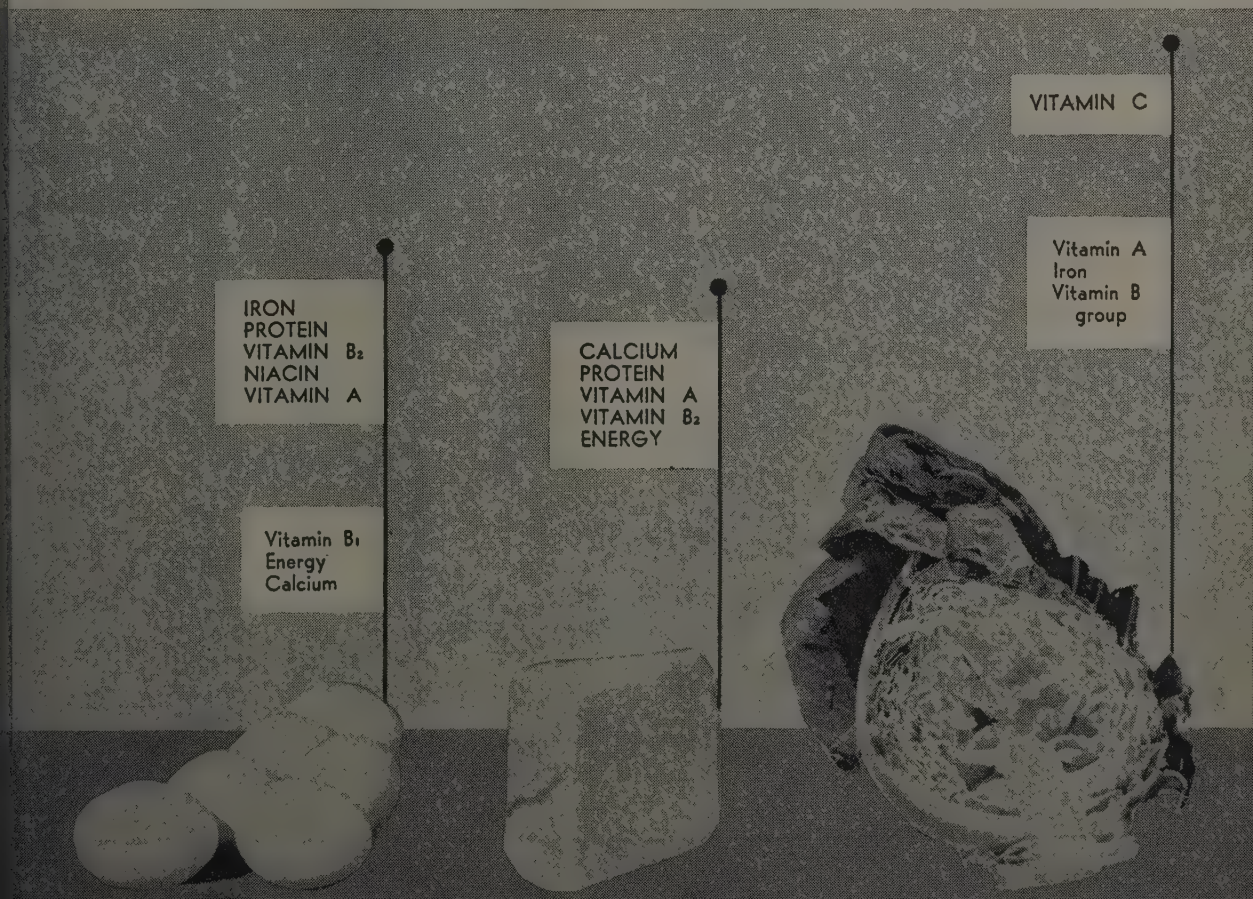
1. Eggs at room temperature beat up much more easily than those straight from a refrigerator and more easily still if they are beaten with the bowl standing in warm water.

2. The addition of small quantities of salt and acid (vinegar, for example) to eggs makes a stiffer, more elastic foam with an even texture which is less likely to collapse or leak beads of syrup on baking.

3. Better results are obtained in meringues, angel cakes, etc., if all the sugar is thoroughly beaten into the egg whites. If an electric mixer is available, the whites need be only slightly beaten before the sugar is added gradually. Longer beating is needed to make the mixture stiff, but the whites are less likely to be overbeaten and the texture is improved. Over-beating the whites (until they are dry or even curdy) before the sugar is added will detract from the quality of the foods containing them. It is advisable, therefore, especially when using preserved egg whites, to err on the side of under-beating before adding sugar to the mixture.

4. Where stiffly beaten egg white is combined with other ingredients, as in sponges or souffles, mixing by pouring the other ingredients slowly into the beaten whites and turning the beater very gently at a slow speed seems to give quicker and smoother blending with no greater loss of air.

5. Though egg mixtures generally should be cooked at low temperatures to produce the best results, there are some exceptional dishes for which a higher temperature for a shorter time



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seems to produce equally good results. Thus custards may be cooked very successfully in a pressure saucepan, provided the time of cooking is not long and the pressure is raised rapidly. Similarly soft meringues for puddings and pies baked at 400 degrees F. for 3 to 5 minutes instead of at 300 to 325 degrees for 15 minutes have less tendency to shrink or leak syrup and are more tender and easily cut than those cooked longer.

The dishes in which souffles and custards are baked should always stand in water, but if this rule is followed, they may be baked successfully for shorter times at slightly higher temperatures.

Recipes with Eggs

Especially for Breakfast

The following recipes are simple and quickly prepared. As preserved eggs may be used in them, they provide a useful alternative to boiled or fried eggs when fresh ones are scarce.

French Toast

3 well-beaten eggs
1 cup of milk
6 large slices of bread
1 teaspoon of vanilla
3 tablespoons of sugar

(6 servings)

Mix together the eggs, milk, sugar, and vanilla. Dip the slices of bread in this mixture and fry in hot fat (butter or dripping) on both sides until they are brown and crisp. If a topping is desired, mix ¼ cup of sugar and ½ teaspoon of cinnamon, sprinkle the mixture over the slices of French toast, and toast in a griller or under the top element of an electric oven until the topping is crisp and lightly browned.

Scrambled Eggs with Vegetables

3 tablespoons of butter or dripping
¼ cup of minced onion
1 cup of chopped cold cooked vegetables such as peas and carrots
2 tablespoons of chopped parsley
5 eggs
¼ cup of top milk
¾ teaspoon of salt
⅛ teaspoon of pepper

(4 to 6 servings)

Melt the butter or dripping and fry the onion and other vegetables (except peas or green vegetables) until golden brown. Beat the eggs, top milk, salt, pepper, and parsley together and pour over the vegetables in the pan. Cook, gently scraping the mixture from the bottom as it cooks, until it is set but is still moist. Serve with bacon or fried or stewed tomatoes.

Scrambled Eggs with Variations

The following foods may be successfully added to scrambled eggs in the proportion of about 1 cup to 4 to 6 eggs:—

Chopped cooked meats such as kidneys, sweetbreads, brains, or bacon.

Cooked vegetables such as peas, beans, onions, carrots, sweet corn, and tomatoes or mushrooms.

Grated cheese.

Herbs such as parsley, cress, thyme, and chives and curry powder in appropriate amounts can also be used.

Baked egg and sausage casserole.

Creamed Eggs

6 hard-cooked eggs
2 cups of white sauce

(6 servings)

Slice the eggs and heat slowly in the white sauce. Serve hot on toast garnished with chopped parsley.

Variations: Add ¾ cup of diced cooked celery, ½ cup of grated cheese, ½ cup of fried mushrooms, or ½ cup of chopped sardines to the above mixture with the sliced eggs.

For Lunch or Tea

Bunwiches

3 chopped hard-cooked eggs
1 to 2 tablespoons of minced onion
2 tablespoons of chopped chives
2 tablespoons of chopped parsley
2 tablespoons of butter
½ teaspoon of salt
⅛ teaspoon of pepper
2 tablespoons of grated processed cheese
6 bread rolls

Mix together the ingredients for stuffing the rolls. Scoop out the centres of the rolls and fill them with the egg mixture. Heat in an oven at 400 degrees F. for 8 minutes. Serve hot.

Curried Eggs

4 tablespoons of butter
2 cups of milk
½ cup of orange juice
4 tablespoons of flour
2 teaspoons of grated orange rind
Parsley
1 teaspoon of salt
1 teaspoon of curry powder
¼ teaspoon of pepper
6 quartered hard-cooked eggs
2 tablespoons of minced onion
3 cups of cooked rice

(4 to 6 servings)

Melt the butter and fry the onion until it is golden brown. Stir in the flour, salt, pepper, and curry powder until the mixture is smooth. Stir in the milk gradually and cook the mixture until it is thick, stirring continuously. Stir in the orange rind and juice, add the quartered eggs, and heat gently until the eggs are heated through. Serve with hot rice and pickle, chutney, or bacon and garnished with parsley.

Egg and Bean Salad

1 tin of baked beans
4 chopped hard-cooked eggs
3 slices of cooked and chopped bacon
1 tablespoon of salad dressing
½ to 1 teaspoon of prepared mustard
¼ teaspoon of salt
⅛ teaspoon of pepper
½ cup of minced onion (optional)
3 tablespoons of chopped parsley

(4 servings)

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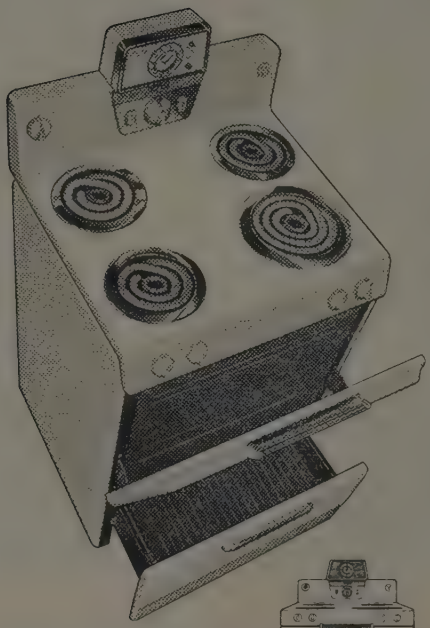

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Mix the beans, eggs, and onions with the salad dressing, salt, pepper, and mustard. Serve hot or cold sprinkled with the bacon and parsley.

Salad Eggs

6 hard-cooked eggs
1 tablespoon of butter
1 tablespoon of cream
½ teaspoon of mustard
1 tablespoon of anchovy paste
½ teaspoon of salt

(6 servings)

Cut the hard-cooked eggs in halves. Remove the yolks and mix them to a paste with butter, cream, mustard, salt, and anchovy paste. Fill the egg whites and place the eggs in a nest of lettuce or watercress. Garnish with radishes and spring onions.

Other fillings for stuffed eggs include chopped celery mixed with salad dressing, chopped onions and mushrooms cooked in butter, grated cheese, cream and chives, parsley or celery, chopped cooked bacon, chopped pickle, or mashed green peas or asparagus.

Egg and Cabbage Salad

6 hard-cooked eggs
1 teaspoon of sugar
2 teaspoons of prepared mustard
2 tablespoons of salad dressing
2 cups of shredded cabbage
4 tablespoons of chopped sweet pickles
1 tablespoon of vinegar

(6 servings)

Mash the egg yolks and blend them with the seasoning and salad dressing. Chop the egg whites and combine all the ingredients.

Winter Salad

4 hard-cooked eggs
1 cup of diced celery
Lettuce leaves
1 cup of diced cooked beetroot
Salad dressing

(6 servings)

Separate the egg yolks and whites, chop the whites, and mix them with the chopped beetroot, celery, and salad dressing. Arrange on lettuce leaves or serve in a bowl sprinkled with sieved egg yolks and chopped parsley, chives, or cress.

For Dinner

Baked Egg and Sausage Casserole

¾lb. of cooked cubed potatoes
4 tablespoons of fat
½lb. of sliced cooked sausages
1 teaspoon of salt
⅛ teaspoon of pepper
½ cup of cooked peas
1 cup of bottled or tinned tomatoes
1 tablespoon of chopped parsley
4 eggs
2 tablespoons of cream

Melt the fat and add the sausages and potatoes. Fry these until the potatoes are slightly browned and add seasonings, peas, tomatoes, and parsley. Place on the bottom of a casserole, break the eggs on top, sprinkle them with salt and pepper, and bake the mixture in a moderate oven (350 degrees F.) until the eggs are cooked (15 minutes). Pour over the cream and serve at once.

Shortcake Omelet

6 eggs (separate the whites and yolks)
¾ teaspoon of salt
⅛ teaspoon of pepper
1 tablespoon of grated or minced onion
2 tablespoons of chopped parsley
3 tablespoons of flour
1 cup of flaked tinned fish, chopped meat such as ham or corned beef, or grated cheese
1 cup of white sauce

(6 servings)

Grease two 8in. layer cake tins and place them in the oven to heat. Beat the egg whites and salt until stiff but not dry and beat the yolks, pepper, onion, flour, and chopped parsley until thick and well blended. Mix them into the stiffly beaten whites. Pour the mixture into the hot cake tins and bake at 350 degrees F. for 15 minutes or until a knife inserted in the centre comes out clean.

Stir the cheese or meat mixture into the white sauce and stand it aside to keep hot.

Put omelets together like a cake with a small amount of the meat or cheese mixture in between. Serve at once with the rest of creamed mixture.

Spinach and Egg Casserole

1lb. of cooked spinach
6 sliced hard-cooked eggs

Cheese Sauce

3 tablespoons of butter
¼ teaspoon of salt
⅛ teaspoon of pepper
3 tablespoons of flour
¼ teaspoon of mustard
1½ cups of milk
½ cup of grated cheese
½ teaspoon of Worcestershire sauce

Below—Winter salad.

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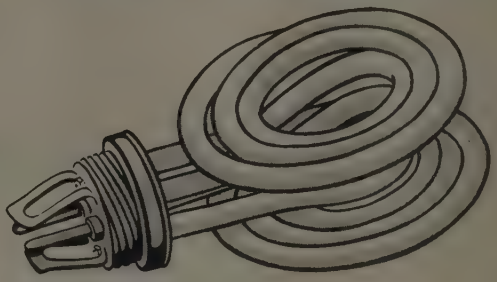

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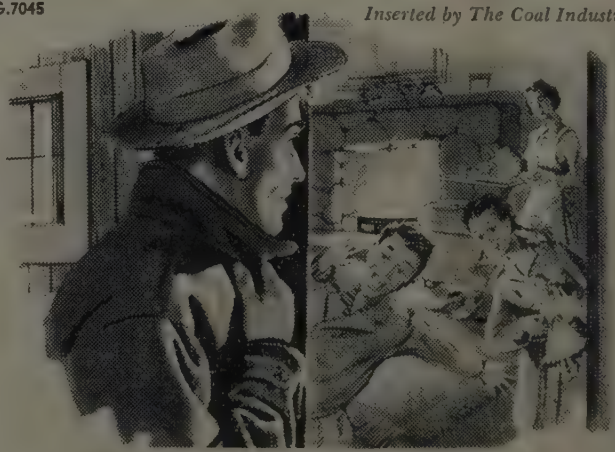

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Make the cheese sauce by melting the butter, stirring in the other dry ingredients and then the milk, and cooking the mixture until it is thick, stirring continuously. Stir in the Worcestershire sauce and grated cheese until the mixture is smooth.

Place the spinach in the bottom of a casserole, arrange the egg slices on top, and pour the sauce over the eggs. Brown under a griller or in the top of the oven.

Using Left-over Whites or Yolks

When there is a baby in the family who is at the age when he can be given only the yolk of the egg, using up the egg whites is often somewhat of a problem. Following are some ways of using egg whites both for everyday dishes and for special occasions.

Snow Pudding

½oz. of gelatine
¼ cup of cold water
Sugar (½ cup and ⅓ cup separately)
Grated dark chocolate
¼ cup of lemon juice
¼ teaspoon of salt
1 cup of boiling water
2 or 3 egg whites
1 teaspoon of grated lemon rind

Soften the gelatine in cold water, add the ¼ cup of sugar, salt, and boiling water. Stir until the gelatine dissolves. Add the lemon juice and rind and stand the mixture in a cold place or in cold water until the mixture is beginning to set. Then beat the egg whites until they are barely stiff and gradually beat in the ⅓ cup of sugar.

Beat the gelatine mixture until it is foamy and mix in the stiffly beaten whites. Put the mixture in a bowl and set it aside until it is firm or place it in a wet mould.

Sprinkle with grated chocolate. Serve with cream or custard sauce.

Surprise Custard

6 egg whites
¼ teaspoon of salt
1 teaspoon of almond essence
¼ cup of sugar
2 cups of milk

(6 servings)

Beat egg whites gently until just blended. Add the sugar, salt, milk, and essence. Beat them until they are thoroughly combined, pour them through a fine strainer into the baking dish, or individual custard cups. Bake in a pan of hot water for 40 to 50 minutes at 350 degrees F. or until set. Sprinkle with nuts and serve with chocolate or butterscotch sauce.

Fruit Whip

½oz. of gelatine
1 cup of fruit juice (hot)
1 tablespoon of lemon juice
2 egg whites
¼ cup of cold water
¼ cup of sugar
½ cup of fruit pulp

(3 to 4 servings)

Soak the gelatine in cold water and add to it the hot fruit juice and half the sugar; stir until the sugar has dissolved. Add the lemon juice. Cool the mixture and when it is beginning to set add the fruit pulp. Beat the mixture until it is frothy. Beat the egg whites until foamy, add the rest of the sugar, and beat the mixture until it is stiff. Fold it into the gelatine mixture. Pour the whip into cold wet moulds. Unmould it when set, sprinkle with chopped nuts, and serve with cream or custard sauce.

Angel Cake

¾ cup of egg whites (at room temperature)
¾ cup of sugar
¼ teaspoon of salt
½ teaspoon of vanilla
¾ teaspoon of cream of tartar
⅓ cup of sifted flour
¼ teaspoon of almond flavouring

Sift the flour with 1oz. of sugar. Add the cream of tartar and salt to the egg whites; beat until stiff and fine but still moist and glossy. Add the sugar a tablespoon at a time, beating slowly only until the sugar is no longer visible.

The mixture should be stiff and shiny. Add the flavourings, mixing slowly.

Using a rotary beater turned slowly or an electric mixer, add the flour a tablespoon at a time by sprinkling it over the egg and sugar mixture. Mix only until dry flour is no longer visible.

Turn the mixture into an ungreased tube pan, run the knife through the mixture to release large air bubbles,

Below—Shortcake omelet.

Angel cake may be served plain or with whipped cream as a sponge.

and smooth the top. Place the cake on the lowest shelf in the oven and bake at 425 degrees F. until the top is a light brown (15 to 20 minutes); turn off the heat and continue baking until the cake is done (10 to 15 minutes).

Invert the pan and let it hang to cool. Store the cake in the pan covered with waxed paper.

Meringue Toppings

Extra egg whites may also be used as meringues for topping custards, pies, bread puddings, etc. The basic recipe is:—

1 egg white
1 to 2 tablespoons of sugar
⅛ teaspoon of salt

Beat the egg white and salt until the white is just past the foamy stage. Beat in the sugar until the mixture is stiff and glossy. Bake in a moderately hot oven (400 degrees F.) for 5 minutes or until the meringue is delicately browned on top.

Serve as soon as possible. Cut with a thin sharp knife or pull the meringue apart with two forks.

Pavlova Cake

6 egg whites (at room temperature)
2 cups of sugar
1 teaspoon of vanilla
⅛ teaspoon of salt
1 teaspoon of vinegar

Beat the egg whites and salt until they are barely stiff enough to hold their shape. Beat in the sugar slowly about 2 tablespoons at a time. If an electric mixer is available, this beating may take up to 30 minutes. Add the vinegar and vanilla and beat for 10 minutes (at high speed with an electric mixer). Mould the mixture into the desired shape on a greased baking sheet. Smooth with a spatula or knife and bake in a cool oven (275 degrees F.) for 45 minutes. Reduce the heat to 250 degrees and bake for another 30 minutes or until done. Remove the meringue to the rack, cool, cover lightly with waxed paper or aluminium foil, and store until needed. Serve with fruit and ice cream or whipped cream.

Left-over Yolks

For the housewife who is making meringues or pavlova cake for a party the following dishes are suggested for using the left-over yolks:—

1. Use two yolks instead of one egg in custards or custard sauce or pikelets.

2. Place the yolks in a strainer. Lower then into simmering water to cover them and then cook for about 10 minutes (until hard). Use this egg in sandwich fillings, salads, sauces, or sieved as decorations.

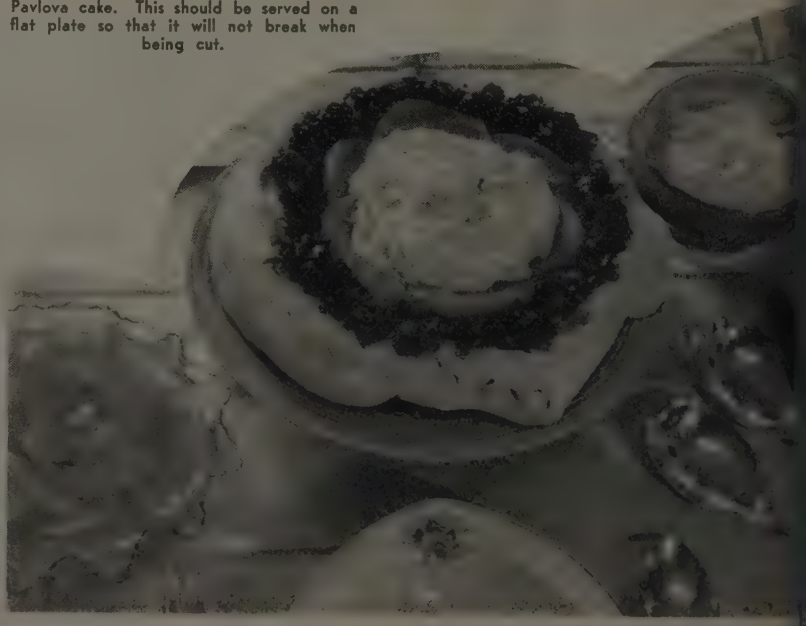
Bavarian Fruit Pie

8in. baked pie shell or a crumb pie shell
1 teaspoon of gelatine
2 cups of milk
¼ cup of flour
2 tablespoons of butter
1 teaspoon of vanilla or 3 tablespoons of sherry
3 slightly beaten egg yolks
1lb. (approx.) of bottled or tinned fruit such as apricots, peaches, or berries
2 tablespoons of water
Sugar (½ cup and ¼ cup separately)
⅛ teaspoon of salt
1½ tablespoons of cornflour
¾ cup of fruit juice

Soften the gelatine in cold water. Scald the milk. Mix the ½ cup of sugar, flour, and salt and stir in the milk. Cook until thickened. Slowly stir this mixture into the beaten yolks and cook gently (over hot water if desired) until it thickens. Add butter and gelatine, remove the mixture from the heat, and stir until the ingredients are dissolved. Cool. Add the vanilla or sherry and pour the pie filling into the pie shell.

Heat the fruit juice and the ¼ cup of sugar and thicken them with cornflour. Cool. Add the sliced fruit and pour the fruit and thickened juice over the pie after the egg mixture has set.

Pavlova cake. This should be served on a flat plate so that it will not break when being cut.



Neat Twin Set for Girl of 10 to 12 Years

MOTHERS with young daughters are always interested in fitting them with warm and serviceable clothes for colder weather and the twin set described and illustrated here would be very attractive to a girl of 10 to 12 years. The main colour is blue and both the jersey and cardigan have an attractive Fair Isle pattern in rust and brown.

MATERIALS required are: 8oz. of 3-ply wool in blue; 1oz. each of the same wool in rust and brown; four small buttons for the jersey; five buttons for the cardigan; two No. 10 and two No. 12 knitting needles.

Measurements: Jersey, length 15½in., chest 28in., sleeve seam 3in.; **cardigan**, length 16½in., chest 28in., sleeve seam 14in.

Tension: 7½ st. to 1in.

Abbreviations: K., knit; p., purl; st. stitch(es); rep., repeat; beg., beginning; dec., decrease; inc., increase; cont., continue; patt., pattern; st.st., stocking stitch (1 row k., 1 row p.); g.st., garter stitch; br., brown; rt., rust; bl., blue.

The Jersey

The Front

Using No. 12 needles and bl. wool, cast on 92 st. and work 2½in. in k. 1, p. 1 rib. Change to No. 10 needles and cont. in st.st., inc. 1 st. at both ends of next row and of every following 6th row until there are 108 st. on needle. Cont. without shaping until work measures 10in., ending with a p. row.

Shaping the armhole: Cast off 5 st. at beg. of next 2 rows, then dec. 1 st. at both ends of next 6 rows. Work 2 rows straight, thus ending with a p. row and dec. 1 st. at end of last row (85 st.).

Working the Fair Isle border: First row: * K. 1 rt., 1 bl. Repeat from * to last st., 1 rt. Second row: * P. 1 bl., 1 rt. Rep. from * to last st., 1 bl. Third row: As first row. Fourth row: * P. 1 br., 5 bl. Rep. from * to last st., 1 br. Fifth row: K. 2 br., * 3 bl., 3 br.; rep. from * to last 5 st., 3 bl., 2 br. Sixth row: P. 3 br., * 1 bl., 5 br. Rep. from * to last 4 st., 1 bl., 3 br. Seventh row: K. 1 bl., * 5 rt., 1 bl. Rep. from * to end. Eighth row: * P. 1 rt., 1 bl., 3 rt., 3 bl., 3 rt., 1 bl. Rep. from * to last st., 1 rt. Ninth row: * K. 2 rt., 1 bl., 1 rt., 5 bl., 1 rt., 1 bl., 1 rt. Rep. from * to last st., 1 rt. Tenth row: * P. 3 rt., 1 bl., 1 rt., 3 bl., 1 rt., 1 bl., 2 rt. Rep. from * to last st., 1 rt. Eleventh row: * K. 2 br., 3 bl., 1 br., 1 bl., 1 br., 3 bl., 1 br. Rep. from * to last st., 1 br. Twelfth row: * P. 1 br., 5 bl. Rep. from * to last st., 1 br. Thirteenth row: As eleventh row. Fourteenth row: As tenth row. Fifteenth row: As ninth row. Sixteenth row: As eighth row. Seventeenth row: As seventh row. Eighteenth row: As sixth row. Nineteenth row: As fifth row. Twentieth row: As fourth row. Twenty-first, twenty-second, twenty-third rows: Rep. first, second, and third rows.

This completes the border. Break off br. and rt. wools. Using bl. wool, cont. in st.st. until work measures 14in. ending with a p. row.

Shaping the neck: Next row: K. 35, turn. Cont. on these st. only, dec. 1 st. at neck edge on every row until 27 st. remain. Cont. without shaping until work measures 15½in., ending at armhole edge.

Shaping the shoulder: Next row: Cast off 9, work to end. Next row: Work to end. Rep. last two rows once. Cast off remaining st. Leave centre 15 st. on spare needle, rejoin wool to remaining 35 st., and work as given for first side.

The Back

Work as given for the front to end of armhole shaping. Cont. without shaping on 86 st. until work measures 12in., ending with a p. row.

Divide for back opening: Next row: K. 45, turn, leave remaining 41 st. on spare needle. Work on these st. only. Next row: K. 4, p. to end. Next row: K. to end. Rep. last 2 rows once more. Next row: K. 1, cast off 2 st. for a buttonhole, work to end. Next row: K. to last st., cast on 2, k. 1. Cont. in st.st. with g.st. border, making 2 more buttonholes at intervals of 1½in., until work measures 15½in., ending at opening edge.

Shaping the neck and shoulder: Next row: K. 4, turn. Work ¾in. in g.st. on these 4 st., making a 4th buttonhole when ½in. has been worked. Cast off. Rejoin wool to 41 st. at neck edge, cast off 8, work to end. Next row: Cast off 9, work to last 2 st., k. 2 tog. Next row: Cast off 2, work to end. Rep. last 2 rows once. Cast off. Rejoin wool to remaining 41 st. at opening edge, cast on 4 st. for underwrap, k. to end. Cont. in st.st. with g.st. border of 4 st. on these 45 st. until work measures 15½in., ending at opening edge.

Shaping the neck and shoulder: As given for first side, but omit the buttonhole.

The Sleeves

Using No. 12 needles and bl. wool, cast on 60 st. and work 1in. in k. 1, p. 1 rib.

Next row: K. 2, * k. twice into next st., k. 2. Rep. from * to last 4 st., k. 4 (78 st.). Change to No. 10 needles and cont. in st.st. until work measures 3in., ending with a p. row.

Shaping the top: Dec. 1 st. both ends of every row until 22 st. remain. Cast off.

The Neck Band

Join shoulder seams with narrow backstitch. With right side of work facing and using No. 12 needles and bl. wool, k. up 97 st. evenly round neck edge, including st. on spare needle at centre front. Work ¾in. in k. 1, p. 1 rib. Cast off loosely in rib.

To Make up

Press work lightly on wrong side, using a hot iron over a damp cloth. Join side and sleeve seams. Backstitch sleeves into armholes, matching seams with side seams. Sew side edges of neck band to g.st. borders. Sew lower edge of underwrap at back of top border. Sew on buttons to match with buttonholes. Press seams.

GIRL'S TWIN SET . . .

The Cardigan

The Back

Using No. 12 needles and bl. wool, cast on 96 st. and work 2½in. in k. 1, p. 1 rib. Change to No. 10 needles and work 2 rows in st.st., inc. 1 st. at beg. of 1st row and ending with a p. row (97 st.). Now rep. once Fair Isle patt. rows 1 to 23 inclusive as given for jersey. Break off br. and rt. wools. Using bl. wool cont. in st.st., inc. 1 st. at both ends of next row and of every following 6th row until there are 111 st. on needle. Cont. without shaping until work measures 10½in., ending with a p. row.

Shaping the armholes: Cast off 5 st. at beg. of next 2 rows, then dec. 1 st. at both ends of every row until 89 st. remain. Cont. without shaping until work measures 16½in., ending with a p. row.

Shaping the shoulders: Cast off 10 st. at beg. of next 6 rows. Cast off remaining st.

The Right Front

Using No. 12 needles and bl. wool, cast on 48 st. and work 2½in. in k. 1, p. 1 rib. Change to No. 10 needles and work 2 rows in st.st., inc. 1 st. at end of 1st row and ending with a p. row (49 st.). Now rep. once Fair Isle patt. rows 1 to 23 inclusive as given for jersey. Break off br. and rt. wools. Using bl. wool, cont. in st.st., inc. 1 st. at beg. of next row and of every following 6th row until there are 56 st. on needle. Cont. without shaping until work measures 9½in., ending at front edge.

Shaping the front edge: Dec. 1 st. at front edge on next row and on every following 4th row until work measures 10½in., ending at side edge.

Shaping the armhole: Cont. to dec. on every 4th row at front edge and at the same time cast off 5 st. at beg. of next row, then dec. 1 st. at this same edge on the next 6 rows. Now work with armhole edge straight, dec. at front edge as before until 30 st. remain. Cont. without shaping until work measures 16½in., ending at armhole edge.

Shaping the shoulder: Next row: Cast off 10, work to end. Next row: Work to end. Rep. last 2 rows once. Cast off remaining st.

The Left Front

Work as given for the right front, but reverse shapings by increasing for side shaping at end of row instead of at beg. of row.

The Sleeves

Using No. 12 needles and bl. wool, cast on 56 st. and work 1½in. in k. 1, p. 1 rib. Change to No. 10 needles. Next row: * K. twice into 1st st., k. 9. Rep. from * to last 6 st., k. 6 (61 st.). Next row: P. to end. Now rep. once Fair Isle patt. rows 1 to 23 inclusive as given for jersey. Break off br. and rt. wools. Using bl. wool, cont. in st.st., inc. 1 st. at both ends of next row and of every following 6th row until there are 83 st. on needle. Cont. without shaping until work measures 14in., ending with a p. row.

Shaping the top: Dec. 1 st. at both ends of every row until 23 st. remain. Cast off remaining st.

The Front Band

Using No. 12 needles and bl. wool, cast on 8 st. and work 3in. in k. 1, p. 1 rib. Next row: Rib 3, cast off 2 st. for a buttonhole, rib to end. Next row: Rib 3, cast on 2, rib 3. Cont. in rib, making 4 more buttonholes at intervals of 2in., then cont. after the 5th buttonhole until border is correct length to fit round front and back of neck edges when slightly stretched. Cast off in rib.

To Make up

Press work lightly on wrong side, using a hot iron over a damp cloth. Join side, shoulder, and sleeve seams, matching borders carefully. Back-stitch sleeves into armholes with narrow seams. Sew front border neatly round front and back of neck edge. Sew on buttons to match with buttonholes. Press seams.

A Pretty Crochet Tea-cloth which Will Last a Lifetime

THE pretty tea-cloth in crochet work illustrated at right is a charming cover for any afternoon tea table. The time spent on making it would be well repaid by its beauty and long life. Directions for making the tea-cloth are given below.

ABBREVIATIONS: Ch., chain; d.c., double crochet; s.c., single crochet; tr., treble.

Materials: Crochet cotton No. 8; crochet hook No. 4½.

Begin with 6 ch. Join into a ring with s.c.

1st round: Always using 3 ch. as first tr. work 16 tr. into ring, s.c. into 3rd of first 3 ch. made.

2nd round: * 5 ch., miss 1 tr., d.c. into next tr., repeat from * all round, s.c. at base of first 5 ch. (8 loops).

3rd round: S.c. to centre of first 5 ch. loop, 7 ch., d.c. in next 5 ch. loop, repeat from * all round, finishing with 7 ch. and s.c. into base of first 7 d.c.

4th round: Into each 7 ch. loop work 7 d.c.

5th round: * d.c. in first d.c., 5 ch., miss 1 d.c., d.c. in next d.c., 5 ch., miss 1 d.c., d.c. in next 5 ch., miss 1 d.c., d.c. in last d.c. This makes 3 loops over the 7 d.c. in each loop. Repeat from * all round.

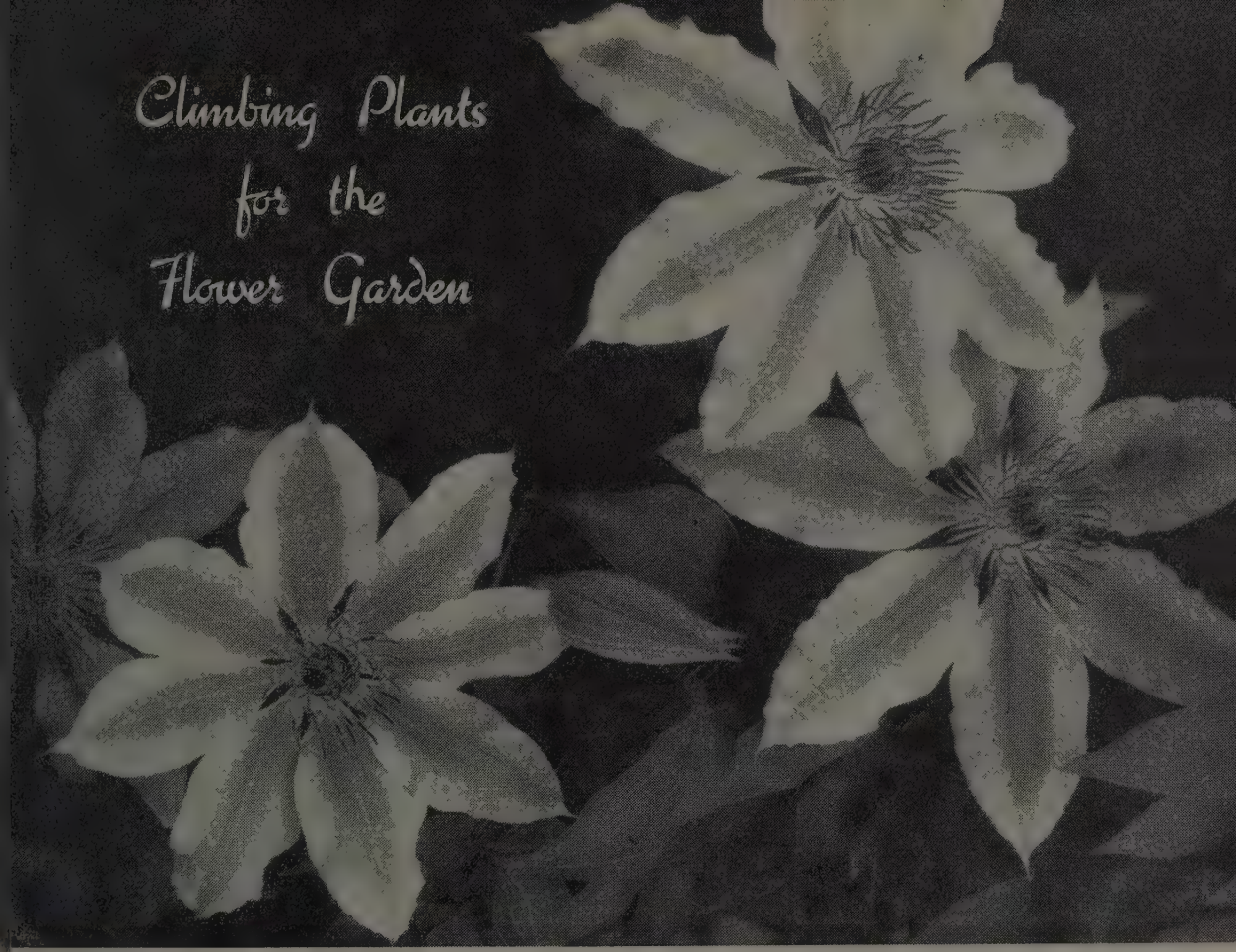
6th round: S.c. to centre of first 5 ch. loop * 5 ch., d.c. in next loop, 5 ch., d.c. into same loop, d.c., 5 ch., d.c. into next loop, d.c. into next loop, which is the first of the next group of three, repeat from * all round, working s.c. instead of the last d.c. at finish.

To join: At the centre loop of the 3 loops, work 2 ch. s.c. through the corresponding loop of first motif, 2 ch., repeat at next centre loop. Third motif, join along side at two points. Fourth motif, again at side, and to the first motif.

Edging: Join at the joining of motifs. 3 d.c. into first 2 loops, d.c. at join between each group of 3 loops, 1 d.c. in next loop, 2 ch. into centre loop work, 1 tr., 2 ch., 4 times, d.c. in next loops, * 2 d.c. between group of three loops, d.c. in next loop, 2 ch. into centre loop work 1 tr., 2 ch. 4 times, 1 d.c. in next loop * repeat between * twice more, 2 d.c. between loops, 3 d.c. in next 2 loops, 1 d.c. at join of motifs.

Filling: 6 ch., join into ring with s.c. Ten ch., * s.c. into 5 ch. loop of motif, 5 ch., d.c. into 6 ch. ring, repeat from * until all 5 ch. loops are joined and centre piece complete.

Climbing Plants for the Flower Garden



CLIMBING plants possess a charm of colour and beauty which may be used to advantage to cover garden features ornately throughout most of the year. A contrast to the formal garden with its gaily bedecked arches, pergolas, or porches is the wild garden or woodland with its trees garlanded with a canopy of exquisite clematis or Banksia rose flowers hanging in delightful festoons. In the first part of this article B. J. Hicks, Horticultural Inspector, Department of Agriculture, Christchurch, discusses the culture of climbing and twining plants in the flower garden. The section of this article on work in the flower garden for September is by K. H. Marcussen, Horticulturist, Department of Agriculture, Christchurch.

GENERALLY most gardeners use the term climbing plants in a loose way to include twining plants. Strictly a climbing plant is one which attaches itself to supports by hooks, tendrils, or other natural appendages to get into the sunshine. Among these plants are roses, clematis, ivies, and Virginia creepers. Twining plants do not have natural means of attachment, but depend on twining round stems and limbs of host plants. Convolvulus, scarlet runner beans, lonicera, and wisteria are examples. As the object in growing climbing and twining plants in the flower garden is practically the same, no distinction is made between the two types in this article.

Climbing plants have their own particular charm and they provide the finishing touches to garden furniture. Fences and walls can be screened, arches and pergolas can be clothed, and light trellis erected to break the wind can be dressed in soft effect. The correctly chosen climber growing luxuriantly on pillars of loggias and porches assists in knitting the garden and house.

Plants' Requirements

Like shrubs and trees, climbers require good, well-drained ground in which to grow. Too often they are planted too close to buildings and under the overhanging eaves. Before a plant is set out the gardener should visualise how it will look in 5 years, and allowance should be made for its growth so that it will benefit from rains like other plants.

Perhaps an idea of the requirements of some climbers may be gained from the growth of the famous Black Hamburg grape vine at Hampton Court, England. This vine now fills a large glasshouse, has a trunk 3ft. in circumference, and produces 1000lb. of grapes each year. The roots extend a great distance and are believed to go under the nearby River Thames.

Where climbers are to clothe iron fences light wooden trellis should be erected about 6in. from the iron. Iron pergolas and iron trellis, like iron fences, are very hot in summer and

HEADING PHOTOGRAPH: Clematis Nellie Moser is a large, attractive, summer-flowering climber. Douglas Elliott photo.

cold in winter and should be replaced by a lasting type of wood. During spring frequent attention should be given to training the rapidly growing shoots of the climbers into the correct positions and to thinning out where necessary.

Climbers of Economic Importance

Gardeners, whether amateur or professional, grow climbing plants for the crops they produce or for ornament. Some plants combine beauty with usefulness. Among plants with this dual capacity are passion fruit, Chinese gooseberries, and grape vines.

Annual and herbaceous climbers are valuable for temporary quick cover or screen in new gardens to provide beauty while choicer climbers are being established. The scarlet runner bean provides a wealth of flowers followed by a crop of edible beans, which often are a welcome addition to the household diet. The seed is sown in situ in spring, usually after severe frosts are over. If they are growing in rich, well-drained, fairly frost-free areas, they can be treated as perennials. Plants left in the ground yield earlier than those from seed sown annually. The moulding of plants on well-drained soil in autumn assists plants to survive severe winters.

Ornamental Plants

Plants for clothing pergolas and rafters should be strong and vigorous. On a permanent structure of masonry various plants with a close clinging habit are suitable. The variegated ivy *Hedera helix tricolor* has small green leaves with silver-white margins and a pink tint. It gives a permanent array of variegated foliage throughout the year with a brief period (4 weeks) when the white flowers reveal their quiet beauty. After the flowers come clusters of black berries. The common green ivy *Hedera helix* grows more rapidly than the variegated variety, but is not as attractive.

Another evergreen climber is *Ficus pumila* var. *minima*, the climbing fig, which is often used for covering the walls of conservatories and occasionally for hanging baskets.

Perhaps one of the best plants is the glory vine (*Vitis coignetiae*), truly named for its glorious wealth of richly coloured autumn leaves—gold, yellow, scarlet, and brown. During spring and summer the brownish-green, round leathery leaves of the vine can adorn pergolas. The flower and fruit are insignificant. The stems with sucker-like tendrils hold the plant to the support, but it is better to tie young growth into position. A strong, vigorous plant on rich, warm, well-drained soil dressed with lime will make 16ft. to 20ft. of growth in a season.

Parthenocissus tricuspidata var. *veitchi*, the small-leaved Virginia creeper, is a lofty climber often growing 50ft. to 60ft. high. Especially in autumn, the richly coloured leaves are very attractive. The variety *aurata* has leaves blocked with yellow and the variety *purpurea* has purple leaves in autumn.

The climber popularly known as Virginia creeper is *Parthenocissus quinquefolia*. Its gorgeous autumn leaves never fail to draw attention. Plants growing against a dry wall may tend to drop their leaves prematurely; an application of sulphate of ammonia, thoroughly watered in, should assist growth and retention of leaves. Generally all plants that make extensive seasonal growth require a rich soil.

[*Perry (left) and Douglas Elliott (right) photos*

Left—*Clematis indivisa* is a large, white, spring-flowering New Zealand clematis of exquisite beauty. Right—*Clematis armandi* is the Chinese counterpart of *Clematis indivisa*.

Wisteria floribunda is a handsome Chinese species with large mauve flowers in attractive racemes often 2ft. to 3ft. long. It flowers during November and December. The variety *violacea pleno* has slightly darker double flowers. The variety *alba* has white flowers and *foliis variegata* has creamy white, variegated leaves.

Laburnum anagyroides, the common laburnum, though not a climber, may be trained to be interspersed with wisteria to give a lovely combination of gold and mauve. Pergolas clothed with wisteria and laburnum require fairly high pillars to give sufficient head room below the blossoms.

Clematis Species

Clematis species are very popular for pergolas and trellis fences. They like having their heads in the sun and their roots in well-drained, rich, semi-shaded soil to which has been added a little lime. *Clematis montana*, *C. indivisa*, and *C. armandi* are spring flowering and require pruning after flowering. *C. montana* is white and sweet scented. The variety *rubens* has reddish foliage, particularly when unfolding, and pink or light pink flowers with four petals.

Among the summer- and autumn-flowering types of clematis are *jackmani* and *lanuginosa*. In late winter these should be pruned back to firm wood, even to within a foot of the ground. In spring, growth comes away to bear flowers from top to bottom. Some named varieties are *C. jackmani superba* (violet-purple), Nellie Moser (mauve-pink with darker, red bars), Gipsy Queen (deep violet), and *C. lawsoniana* (rose-purple).

Roses

The most popular climbing plants are, of course, roses. A good, rich, well-drained soil in a sunny, open position suits them best. Pruning consists of cutting back the flowering shoots and the removal of old wood as new wood becomes available for replacements.

Rambler roses tend to flower once in the season and are best pruned after flowering. This usually consists of cutting back spent flowering canes to ground level and training in new canes. From *Rosa wichuraiana* have been evolved several well-known varieties which do remarkably well on their own roots. Cuttings taken during autumn strike remarkably freely. Typical ramblers are American Pillar, Dorothy Perkins, Excelsa, Easlea's Golden Rambler, and Paul's Scarlet.

Climbing roses of the hybrid tea or or tea class usually flower more than once in the season. As there is a great range of varieties, those known to do well in the district should be chosen for prominent positions.

Half-hardy or Tender Ornamental Climbers

Where a greenhouse or a conservatory is available more tender climbers can be grown. A rich, well-drained soil with plenty of root room is required. Tubs and pots are often used, but where the plants need more room they are planted in the soil. However, in sheltered, warm districts of New Zealand, many tender plants can be grown successfully outside, and a description of some of them follows.

Aristolochia macrophylla (Dutchman's Pipe) is the best-known vine of this genus for shade. The purple flowers have the peculiar shape of a Dutchman's pipe. The foliage is large and heavy and admirably suitable for providing shade on arbours, pergolas, and porches. Another species, *A. triangularis*, has smooth, triangular leaves about 4in. long and 3in. wide. The showy flowers are borne singly and are set in a moderately dense background of foliage. They are larger than those of *A. macrophylla* and are spotted with purple.

General favourites wherever they are grown are varieties of *Allamanda*. These tropical shrubs and climbers were found originally in Brazil and Central America. They are very easy to culivate, thriving in a warm greenhouse or warm position in the open. They need a fairly rich, well-drained soil. The flowers are tubular with 5 petals. *Allamanda cathartica* var. *hendersoni* has orange-yellow flowers 3in. across with 5 light spots on the throat. Unopened flowers have a purplish exterior. The lance-like, thick, leathery leaves occur in threes or fours. *Hendersoni* is an excellent free-flowering, vigorous, climbing variety suitable for covering pergolas and roofs of summer-houses. *A. violacea*, which has purple flowers, should be grafted on to a vigorous variety to thrive well.

Asparagus plumosus is a woody, tall-climbing vine with finely divided leaves rivalling the beautiful leaves of some maidenhair ferns. This plant provides useful light shade, as well as supplying foliage for floral work.

Outstanding in beauty are the pendulous magenta, purple, or red flowering bracts of the showy, summer-flowering bougainvilleas, which hang in delightful festoons from arbours, arches, pergolas, and porches. *Bougainvillea glabra* tends to be a more shrubby type of climber. The leaves are smooth and bright green. The flowering bracts are heart shaped to oval, distinctly veined, and a rosy pink. More free flowering and handsome is the variety *sanderiana*, which can be kept dwarf and trained satisfactorily round pillars. The variety *variegata* has the added advantage of having ivory-white markings on its light green leaves.

[*Douglas Elliott*

Solanum wendlandi is a useful climber for mild districts and sheltered places. It bears large, blue-mauve flowers in profusion in late summer.

B. spectabilis is a very vigorous climber, progressing by stout hooked spines. It has large, thick leaves with flowers in large, attractive panicles in colours of deep rose to purple and green. Bougainvilleas require a rich, well-drained soil and a position relatively free of frost.

A plant not used as often as it could be for clothing pergolas in warm districts is *Cobaea scandens*, a half-hardy climber from Central America. It is treated often as an annual, though it is a tender perennial climber making 10ft. to 20ft. in a season. The compound leaves have 2 or 3 pairs of simple leaflets terminated by a tendril. The light violet or greenish-purple bell-shaped flowers are 1in. to 1½in. across. It is a rapid grower and should be grown on poor, sandy soil, as otherwise leaves are made instead of abundant blooms. It is one of the most popular vines treated as annuals and should find a place for covering various structures in new gardens.

Dioscorea batatas is the Chinese yam, a tall climber (10ft. to 30ft.) with heart-shaped to oval leaves with clusters of cinnamon-scented white flowers arising from the axils of the leaves. The root is a tuber 2ft. to 3ft. long in the ground and usually larger

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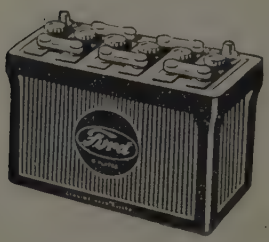

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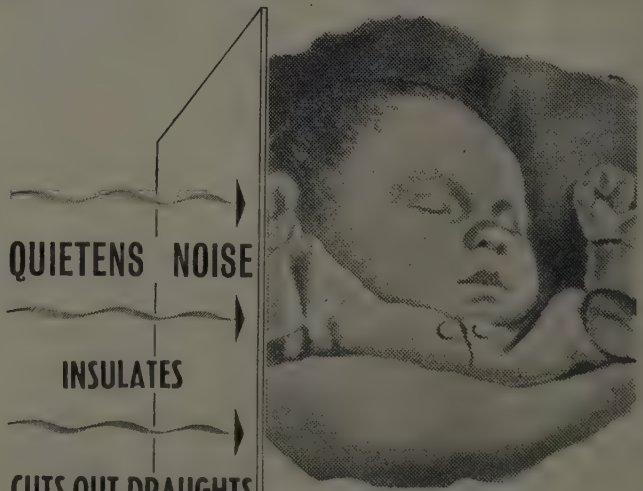

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at the lower end. The roots overwinter satisfactorily in the ground and send up handsome twining shoots in spring. *D. discolor* has leaves similar in shape to those of *D. batatas* with several shades of green and white banding along the midribs. The flowers are greenish and inconspicuous.

Among climbers of commercial value for the floral trade are hoya and lapageria. *Hoya carnosa*, usually known as the wax plant climber, needs some support, as it grows 12ft. to 20ft. high. It is a tropical evergreen climber with thick, ovate opposite leaves and with showy, pink, fragrant, waxlike flowers produced in dense clusters in great abundance in summer, though occasionally blooms appear at other times. The plant is easy to grow, being propagated by soft wood cuttings in spring or by layering. Spraying with summer oil and nicotine sulphate or D.D.T. will control mealy bug.

Lapageria, the Chilean bell flower, is a very choice half-hardy evergreen climber. It is not easy to grow. Successful cultural treatment seems to require a moist, well-drained soil and an even, moist climate. Propagation is by cuttings, layers, or seed. Plants raised from seed are often more vigorous, but may not be true to variety. *Lapageria rosea* has alternate leaves with showy, bell-shaped, rose coloured flowers about 3in. long hanging from the axils of the leaves on the higher stems. The flower has six fleshy petals, three outer and three inner, with six stamens. The fruit is a three-sided fleshy red berry somewhat elongated to a point. The variety *albiflora* has whitish flowers; *superba* has large, brilliant crimson flowers.

Solanum wendlandi has lobed or trifoliate leaves with smooth margins. The lilac blue flowers are 2½in. across and in large umbels (clusters), often 12in. in diameter. The stems have a few prickles. It is the most showy of cultivated solanums, making a brilliant display in summer and autumn. The masses of flower in their large umbels have been known to grow up 30ft. to 40ft. into trees or gables of buildings.

The plant is a half-hardy evergreen climber and can be grown successfully in warm districts or in sheltered localities. A rich, well-drained soil with a northerly aspect is suitable for this gross feeder. It is propagated by cuttings or by seed. Wood of the old vine cut into lengths of about 9in. can be used for cuttings and these should be inserted in sand or light loamy soil. Almost every cutting will grow.

Temporary Ornamental Climbers

For temporary and purely ornamental furnishing of garden structures the following plants are useful: *Ipomoea purpurea*, an annual climber with delightful blue flowers which is often known as morning glory vine; *Lathyrus odoratus*, the much-prized sweet pea; *Lathyrus latifolius*, the perennial sweet pea (usually white, red, or light mauve); *Tropaeolum majus*, the popular climbing nasturtium; and *Tropaeolum speciosum*, a perennial plant which appears faithfully each year, giving a vivid display of scarlet flowers during summer—hence its popular name of flame flower or flame creeper.

[*Green and Hahn*

Virginia creeper adequately covers the bold outline of the rafters of this pergola.

Though some quick-growing climbing plants require fairly rich soil in a well-favoured position to do well, others require a poor soil. For example, sweet peas require a good soil to make good growth and an abundant crop of flowers with long stems, but *T. majus* requires a poor soil.

Many people plant a garden with their carefully selected species, but do not realise that planting, soil preparation, and planting are just the beginning of the attention which must be given. A climbing plant often needs more care than many shrubs and trees and it requires pruning and training in directing growth to cover the garden feature.

Diseases and Pests

At various times of the year diseases and pests attack climbing plants. Broadly, pests are divided into two classes: Those which chew the tissue of plants and have strongly developed mouth parts; and sucking pests, which have needle-like mouth parts to pierce the leaf and stem to draw the sap from the internal tissue.

Among the chewing pests are leaf-roller caterpillars, leaf-eating beetles, snails, and woodlice. Materials used for control include arsenate of lead, D.D.T., and metaldehyde bran bait for slugs and snails.

Sucking insects are controlled by materials which suffocate them by blocking their breathing pores or are absorbed through their skin or breathing pores. Among pests of this type likely to attack climbers are aphides (greenfly of various kinds and mealy bugs), red spider mites, scales, and thrips. Effective spray materials which control these pests are winter oil on deciduous plants in the dormant period and summer oil in the growing season. Nicotine sulphate, lindane, and D.D.T. are also useful.

Concentrations of materials (to make 4 gallons of spray) which have been found effective are:—

D.D.T.: ½oz. of 50 per cent. wettable powder.

Arsenate of lead: 1oz.

Nicotine sulphate: 4/5 fl. oz. plus activator (lime sulphur, summer oil, or soft soap).

Lindane: 1oz. of 16 per cent. material, ½oz. of 25 per cent. material.

Winter oil: 1 pint 12 fl. oz.

Summer oil: 8 fl. oz.

Diseases

There are several diseases which attack climbers. Growers of grapes and passion fruit know how important it is to keep mildews, leaf spot, and various bacterial diseases in control. Generally sulphurs have been found effective in the control of mildews and some leaf spot fungi, but these should not be applied 14 days before or after an oil spray. The combination of colloidal sulphur with lime sulphur has been found to be a more effective control than either one alone. These work effectively in hot weather.

For the control of many leaf-spotting fungi and bacterial diseases (for example, blast) copper oxychloride or

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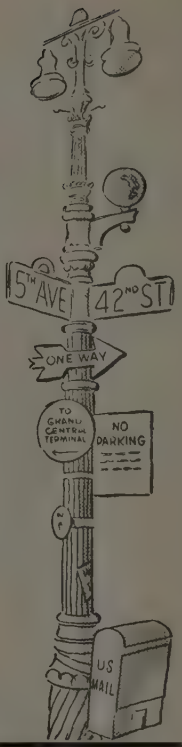

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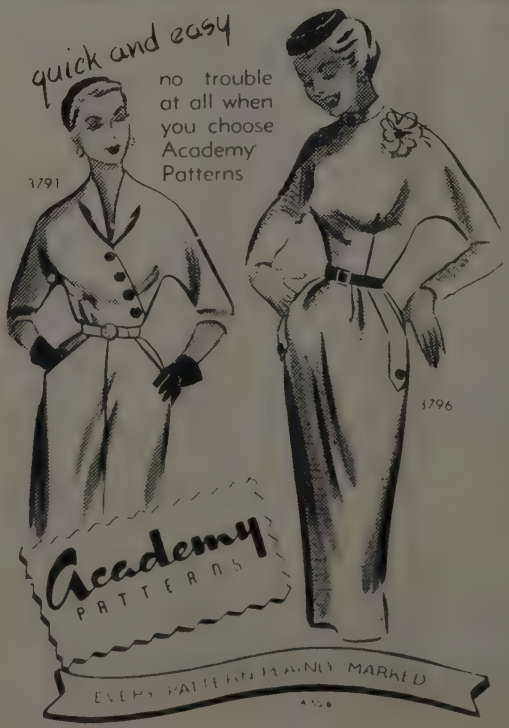

Bordeaux sprays of varying strengths are recommended. Copper sprays are generally more effective in damp, cool weather and remain on the climbers for 5 to 6 weeks, depending on the weather. They are also compatible with oil sprays.

As some of the new sprays now available have yet to be tested on some of the climbers mentioned, caution should be exercised in the use of these sprays and the Horticulture Division, Department of Agriculture, should be consulted for the latest information.

Garden Work for September

September is a very busy month in the flower garden. In northern districts there will be little danger of frost toward the end of the month, but in the south it may still be too early to do much planting out of tender subjects, though some growth will take place.

Weeds will again become plentiful and the hoe should be used regularly. It takes little time to hoe the garden if weeds are only small, and the loosening of the topsoil is beneficial to most plants in the flower garden.

Lawns will also be growing vigorously, especially if topdressing with fertilisers has been done as recommended last month. It is much better to cut the lawn twice a week, if required, than to let it grow too long between cuts. Frequent light cuts will encourage development of a dense sward. The lawnmower should be sharp, as otherwise it will tear the grasses and give an untidy appearance. New lawns sown last month may require watering if there is a dry period, but if the ground was moist at the time of sowing, watering should seldom be necessary before the seed has germinated.

Bulbs

Spring bulbs provide a wealth of colour, but tend to look rather unsightly once they have flowered. However, the foliage should not be cut off while it is still green, but should be allowed to dry before being removed. The fact that the flower is developed in the bulb before it makes new roots in autumn shows how important the growth after flowering is and how necessary it is to leave the foliage intact.

In districts where the bulb fly appears early, sprays of D.D.T. should be applied as a protection. Applications should be at a strength of ½oz. of 50 per cent. wettable D.D.T. to 3 gallons of water and should be repeated at 10-day intervals while the fly is active.

FLOWER GARDEN WORK FOR SEPTEMBER

Chrysanthemums may now be lifted and divided into pieces as shown.

Border Plants

Many of the herbaceous plants will now be growing vigorously and some thinning out of the weaker shoots may be required, especially where replanting has not taken place during the dormant season. This thinning will make the remaining shoots stronger and the plants tidier. Shoots should be removed as close to the base as possible to prevent regrowth.

Staking should be done before the plants tumble over. It is easier to do while the plants are a reasonable size, and with correct tying the stakes can be concealed as the plants grow. Staking is more difficult to do and is never really satisfactory if left until the plants have blown over.

The soil should be forked over lightly or hoed after work has been done in the border.

Chrysanthemums

Chrysanthemum cuttings or offsets prepared last month will be making growth and may be ready to plant out late in the month. If new plants have not been prepared as recommended last month, the old stools should be broken up now and rooted pieces planted direct in their growing position. A good type of rooted offset from an old stool is shown in the illustration above.

The position for chrysanthemums should be sunny with free circulation of air. The soil should be in good heart and must not lack humus. If necessary, compost or animal manure should be incorporated, though it would be better had this been done last autumn. If organic material has been added, a light dressing of lime (2oz. to the square yard) will be beneficial in most districts. A dressing of a complete fertiliser or blood and bone at 2oz. to the square yard will assist the plants to become established. The soil must not be loose when chrysanthemums are planted, as that will encourage soft growth.

Chrysanthemums should not be grown in the same soil year after year. Crop rotation is generally difficult in the flower garden, but a change from chrysanthemums to dahlias is often possible and will be beneficial to both species.

Dahlias

Dahlia beds are prepared in the same manner as described for chrysanthemums. It is wise to put the stakes in before the tubers are planted, as then no damage will be done to the roots during staking. Dahlias should not be planted before danger of frost is over, which in some districts may be as late as November.

Large clumps will not give the best plants, and especially in the milder districts these should be divided and plants grown from individual tubers if not from cuttings. Small-tubered plants seem to get away more freely and are not affected by thrips in the early stages to the same extent as are large clumps when these have been left intact. Small-tubered plants may come into flowering a little later than large clumps, but that can only be considered an advantage, as better blooms are generally produced a little later in the season.

FLOWER GARDEN . . .

A few weeks before the expected time of planting out the old tubers should be placed in a warm position and kept moist. They will then soon sprout and can be divided into the required number of plants. The illustration at right shows how little of the old tuber is needed to make a good plant.

Gladiolus

If gladiolus flowers are required for the Christmas holiday period, corms should be planted during September. The time required to reach the flowering stage varies according to the variety and size of the corms; it is also affected by the climate. Cormlets should always be planted early to give them as long a growing season as possible and to allow for them to ripen off before autumn rains begin.

Type of soil is not important for gladiolus provided drainage is good. However, an adequate supply of organic material in the soil is important. The best gladioli are grown where a grass paddock has been turned in the previous season. Such conditions are seldom found in flower gardens and the alternative is to build up the existing soil with compost or animal manure. In the gladiolus bed this should always be done during autumn, as the corms should not be planted in loose soil or in contact with fresh manure.

Gladiolus corms should be planted 4in. to 6in. deep according to the nature of the soil; on a heavy soil they should not be planted as deeply as on a sandy soil. Cormlets should not be planted quite as deeply.

Bedding Plants

Where annuals were sown last month attention must be given to them now. Seedlings should never become crowded. They should be pricked out from boxes or adequately thinned if sown in their permanent position. If left to grow too close together, seedlings will become weak and spindly and will be more easily infected with fungous diseases.

It is not wise to plant bedding plants out in their growing position while they are still fairly small. Better attention can be given to them if they are pricked out into a small area and they will also protect each other to some extent.

Sowings can be made of the plants that require more heat, such as salvia, zinnia, and celosia. Asters and marigolds should also be put in.

Bedding begonias can be divided and planted out when danger of frost is over and will make a good display throughout summer. If old bedding begonias are to be supplemented with new ones, allowance should be made in the layout for the fact that old ones generally will grow taller.

A dahlia plant removed from an old tuber. A strong root system has already developed.

Trees and Shrubs

In some districts September is one of the driest months of the year and it may be necessary to water the trees and shrubs which were planted during the past autumn and winter, especially any subjects planted late. A mulch, which may consist of any dead or decaying organic materials, will assist in preventing evaporation. Care should be taken that no rotting materials are placed against the stems of the trees, as this may cause a breakdown of the bark and thus allow entry of disease organisms.

Where no further frosts are expected subjects that are frost tender while young and evergreens such as rhododendrons and camellias can be planted out.

In the colder districts hydrangeas and fuchsias can be pruned. When pruning hydrangeas gardeners should remember that flowering shoots can be expected from the terminal buds of most shoots and from the large buds situated along the branches if the branches are pruned back to one of these buds. The smaller buds cannot be expected to produce flowers until late in the season. Some thinning out of the shoots on hydrangea bushes is generally advisable. Fuchsias will tolerate fairly severe pruning and will be better for it, as the new shoots will be more vigorous and flower more profusely.

A mulch of animal manure will be of great benefit to established fuchsias and hydrangeas and to rhododendrons and camellias. All these plants prefer a cool root run and will benefit from the nutrients which will be made available from the manure.

Roses

Pruning of roses should have been completed in all but the coldest districts and the plants should now be making good growth. It is generally advisable to rub out some of the shoots where they have developed too thickly or where they are growing in an undesirable direction, such as through the centre of the bush. Attention should be given to pest and disease control, which is discussed in a later section of this article.

Glasshouse Plants

Glasshouse plants that were "reconditioned" last month will now be making new growth. Watering should be done with care and plants should not be subjected to draughts. A daily syringing will be of great benefit on hot days, but should be done early in the day to ensure that plants are dry by night. A fairly high degree of humidity should be kept in the glasshouse if all plants growing there will tolerate it.

Pests and Diseases

The succulent growth appearing on most plants during spring is a favourite diet for snails and slugs, but they can be controlled easily by placing bait near their haunts in the evenings. Bait can be made by mixing 1oz. of metaldehyde powder with 2½lb. of bran; if the mixture is moistened with molasses, it is still more effective.

Aphides may also become numerous in spring and should be controlled, not only because of their weakening effect on plants, but because they are carriers of virus. Contact sprays of nicotine sulphate or H.E.T.P. can be used, though control over a longer period will be obtained by applying lindane either as a dust or as a spray.

Fungous diseases are very difficult to control once they have become established and protective applications of a suitable fungicide should be made. Roses, for example, should be sprayed with Bordeaux mixture or thiram for protection against black spot and rust, or they can be dusted with a combined thiram and sulphur dust, which will also control powdery mildew. Such a dust should contain 10 per cent. of actual thiram and not less than 50 per cent. of finely ground sulphur.

An article giving detailed information on pest and disease control was published in the October 1954 issue of the "Journal".

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